All our energy.
All the time.

MARITIME ELECTRIC
A FORTIS COMPANY

May 14, 2021

Island Regulatory & Appeals Commission
PO Box 577
Charlottetown PE C1A 7L1

Dear Commissioners:

Application for an Order to Approve the Stage 1 Rate Design Changes

Please find enclosed six (6) copies of Maritime Electric's Application for an Order approving the Stage 1 rate design changes proposed therein. As outlined in the Application, a second stage will be required post Stage 1 to bring the Revenue-to-Cost ratios of certain customer classes fully in the range of 95 to 105 per cent in a reasonable period of time as ordered by the Commission.

The Company is also requesting an order to vary Paragraph 31 of Order UE20-06 allowing the Company to file its next General Rate Application prior to receiving approval of the rate design changes set out in this Application.

An electronic copy will follow. If you require further information, please do not hesitate to contact me at (902) 629-3701.

Yours truly,

MARITIME ELECTRIC

Michelle Francis
Vice President, Finance & Chief Financial Officer

MF21
Attachments

180 Kent Street • PO Box 1328 • Charlottetown, PE C1A 7N2
telephone 1-800-670-1012 • **fax** 902-629-3665 • **maritimeelectric.com**

C A N A D A

PROVINCE OF PRINCE EDWARD ISLAND

BEFORE THE ISLAND REGULATORY
AND APPEALS COMMISSION

IN THE MATTER of Section 10, 13(1) and 20 of the *Electric Power Act* (R.S.P.E.I. 1988, Cap. E-4) and **IN THE MATTER** of the Application of Maritime Electric Company, Limited for an order approving a four year rate design plan for Stage 1 changes to Residential, General Service, Large Industrial and Street Lighting classes for electric service commencing on March 1, 2022 and for certain approvals incidental to such an order.

AND

IN THE MATTER of Section 12 of the *Island Regulatory and Appeals Commission Act* (R.S.P.E.I. 1988, Cap. 1-11) and **IN THE MATTER** of the Application of Maritime Electric Company, Limited for an order varying paragraph 31 of Order UE20-06 and for certain approvals incidental to such an order.

APPLICATION
AND
EVIDENCE OF
MARITIME ELECTRIC COMPANY, LIMITED

May 14, 2021

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IN THE MATTER of Section 12 of the *Island Regulatory and Appeals Commission Act* (R.S.P.E.I. 1988, Cap. 1-11) and **IN THE MATTER** of the Application of Maritime Electric Company, Limited for an order varying paragraph 31 of Order UE20-06 and for certain approvals incidental to such an order.

Introduction

1. Maritime Electric Company, Limited ("Maritime Electric" or the "Company") is a public utility subject to the Electric Power Act ("EPA" or the "Act") engaged in the production, purchase, transmission, distribution and sale of electricity within Prince Edward Island.

Application

2. Maritime Electric hereby applies for an order of the Island Regulatory and Appeals Commission ("IRAC" or the "Commission") approving a variance from paragraph 31 of

Order UE20-06 under section 12 of the Island Regulatory and Appeals Commission Act; and,

3. Maritime Electric hereby applies for an order of the Commission approving a four year rate design plan for Stage 1 changes to Residential, General Service, Large Industrial and Street Lighting classes for electric service commencing on March 1, 2022 and for certain approvals incidental to such an order.

Procedure

4. Filed herewith is the Affidavit of Jason C. Roberts, T. Michelle Francis, Angus S. Orford and Enrique A. Riveroll which contains the evidence on which Maritime Electric relies in this Application.

Dated at Charlottetown, Province of Prince Edward Island, this 14th day of May, 2021.

D. Spencer Campbell, Q.C.

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65 Grafton Street, PO Box 2140
Charlottetown PE C1A 8B9
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Solicitors for Maritime Electric Company, Limited

2.0 AFFIDAVIT

C A N A D A

PROVINCE OF PRINCE EDWARD ISLAND

BEFORE THE ISLAND REGULATORY
AND APPEALS COMMISSION

IN THE MATTER of Section 10, 13(1) and 20 of the *Electric Power Act* (R.S.P.E.I. 1988, Cap. E-4) and **IN THE MATTER** of the Application of Maritime Electric Company, Limited for an order approving a four year rate design plan for Stage 1 changes to Residential, General Service, Large Industrial and Street Lighting classes for electric service commencing on March 1, 2022 and for certain approvals incidental to such an order.

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AFFIDAVIT

We, Jason Christopher Roberts of Suffolk, T. Michelle Francis of Emyvale, Angus Sumner Orford of Charlottetown and Enrique Alfonso Riveroll of New Dominion, in Queens County, Province of Prince Edward Island, MAKE OATH AND SAY AS FOLLOWS:

1. We are the President and Chief Executive Officer, Vice President, Finance and Chief Financial Officer, Vice President, Corporate Planning and Energy Supply and Vice President, Customer Service for Maritime Electric Company, Limited (“Maritime Electric”

or the "Company"), respectively, and as such have personal knowledge of the matters deposed to herein, except where noted, in which case we rely upon the information of others and in which case we verily believe such information to be true.

2. Maritime Electric is a public utility subject to the provisions of the Electric Power Act engaged in the production, purchase, transmission, distribution and sale of electricity within Prince Edward Island.

3. We prepared or supervised the preparation of the evidence and to the best of our knowledge and belief the evidence is true in substance and in fact.

SWORN TO SEVERALLY at
Charlottetown, Prince Edward Island,
the 14th day of May, 2021.

Jason C. Roberts

T. Michelle Francis

Angus S. Orford

Enrique A. Riveroll

A Commissioner for taking affidavits
in the Supreme Court of Prince Edward Island.

3.0 EXECUTIVE SUMMARY

3.1 Background

The Residential declining second block rate structure has been under discussion for more than a decade. In the 2016 General Rate Application, Maritime Electric Company, Limited ("Maritime Electric" or "the Company") proposed eliminating the Residential second block, however the change was deferred by the 2016 General Rate Agreement (the "Agreement") which set rates until February 28, 2019. The Island Regulatory and Appeals Commission ("IRAC" or the "Commission") stated the following in Order UE16-04R, paragraph 59 approving the Agreement:

> *"The Commission views the continued existence of the residential second block as being contrary to the principles behind the [Electric Power Act], which directs that the rates, tolls and charges for electric power should be reasonable, publicly justifiable and non-discriminatory… the Commission is hereby putting Maritime Electric and the Government on notice that any proposed continuation of the residential second block rate in future rate applications will require compelling evidence of its equity to ratepayers."*

More recently, in Orders UE19-08 and UE20-06, the Commission ordered Maritime Electric to propose changes to its current rate structure to achieve revenue-to-cost ("RTC") ratios within the range of 95 to 105 per cent over a reasonable period of time.

In Order UE20-06 paragraph 31, the Commission also ordered the Company to file with the Commission and obtain approval for a new rate structure prior to filing its next General Rate Application ("GRA").

3.2 Timing of General Rate Application

Under the EPA, the Commission is required to set rates, tolls and charges for electric service that are "reasonable, publicly justifiable and non-discriminatory" and in doing so, balance the interests of both ratepayers and Maritime Electric.

In Order UE20-06, paragraph 31 the Commission ordered the Company to file with the Commission and obtain approval for a new rate structure prior to filing its next GRA. In doing so, the Commission has expressed the need to ensure approved customer rates are such that the revenue recovered from each customer class closely matches the cost of providing service to those customers.

However, the Commission also has an obligation under the EPA to allow the Company to recover its annual revenue requirement on a timely basis and delaying the filing of the Company's next GRA until a rate plan is approved could hamper the Company's ability to do so. In addition, the Stage 1 rate design changes put forth in this Application can be approved independently of a GRA. The Company is, therefore, requesting a variance from paragraph 31 of Order UE20-06 under Section 12 of the Island Regulatory and Appeals Commission Act. Section 5.0 of this Application provides more detailed support for this request.

3.3 Boutilier Study

On June 30, 2020 pursuant to Order UE19-08, the Company filed a comprehensive Rate Design Study (the "Boutilier Study"). The Study was prepared by Robert P. Boutilier, P.Eng., an independent expert in rate design and other matters related to the electric energy industry. The Boutilier Study outlined a number of key findings and recommendations regarding the elimination of the Residential class declining second block rate, the migration of large farm customers to the Small Industrial rate class, the need to gather and analyze additional metering data for the Residential and General Service rate classes and the potential application of time-of-use ("TOU") rates to address electric vehicle charging load impacts and on-Island capacity concerns. A more detailed discussion of the Boutilier Study is provided in Section 6.0 of this Application.

3.4 Customer Consultation

Due to the onset of the COVID-19 pandemic in early 2020, the Company was not able to hold in-person stakeholder consultations prior to filing the Boutilier Study. Customer consultation is considered a critical step in developing a proposed rate structure. One of the stakeholder groups considered to be most impacted by the rate proposals in this

Application is farm customers. In July of 2020, the Company met with the PEI Federation of Agriculture to discuss the direction from the Commission to change the current approved electricity rate structure, preliminary results of the Company's Farm Study, the elimination of the Residential class declining second block rate and how best to consult with the farming community on Prince Edward Island ("PEI"). With continued COVID-19 restrictions on public meetings in place, the Company sought feedback from the farming community through an online survey.

The survey results indicate that the farming community has serious concerns over any rate proposals that will result in increased costs for their operations. Respondents strongly recommended a phased-in approach to removing the declining second block rate over a period of five years or longer. Respondents also expressed the need for more education and incentives for energy conservation and for renewable self-generation energy options for farms. Finally, lack of access to three phase power is perceived as a barrier to energy conservation by some farm customers.

The results of the online survey and consultations with the Federation of Agriculture and other various farm groups and interested parties are provided in Section 7.0 of this Application.

3.5 Rate Plan

The Company is proposing a two stage approach to achieving the required RTC ratios of 95-105 as discussed in Section 8.0 of this Application.

Stage 1 involves phasing out the Residential declining second block energy charge by increasing the rate to be the same as the first block rate in four equal annual steps beginning on March 1, 2022 through to March 1, 2025. As recommended by Mr. Boutilier in his report, the Company is also proposing that large farms be given the option to be eligible for the Small Industrial class if it proves advantageous for those customers to do so.

Stage 1 also involves a one-step rate increase for the Large Industrial class on March 1, 2022 and a two-step increase for the Street Lighting classes on March 1, 2022 and March 1, 2023 to bring both of these classes within the target RTC ratio range.

Finally, the incremental revenue from these rate adjustments will be offset by a corresponding decrease in the General Service rate to improve the RTC ratio of that class.

The proposed changes in Stage 1 will improve the RTC ratios of the various classes. However, two classes, the Residential class and the General Service class, will still have RTC ratios outside the target range after Stage 1 rate changes are fully implemented. Thus, a second stage, post-March 1, 2025, will be needed to address the remaining gap.

The Company is not seeking approval of Stage 2 at this time but is proposing a plan to keep the Commission informed of the progress from Stage 1 rate changes, the results of the ongoing Residential and General Service load studies and future Cost Allocation Study results that can be used to formulate specific Stage 2 rate recommendations to be filed with the Commission on or before December 31, 2024. This is discussed further in Section 8.8 of this Application.

3.6 Additional Considerations and Emerging Trends

In Section 9.0 of this Application, the Company discusses the two remaining recommendations from Mr. Boutilier's report that are not addressed in Stage 1 of this Application and why they are being deferred at this time. This section also considers potential rate impacts of further penetration of net metering and the Commission's direction to consider new and innovative rate structures in Order UE20-06.

4.0 INTRODUCTION

4.1 Corporate Profile

Maritime Electric owns and operates a fully integrated system providing for the purchase, generation, transmission, distribution and sale of electricity throughout PEI. The Company's head office is located in Charlottetown with generating facilities in Charlottetown and Borden-Carleton.

Maritime Electric is the primary provider of electricity on PEI delivering approximately 90 per cent of the energy supplied on PEI. To meet customers' energy demand and supply requirements, the Company has contractual entitlement to capacity and energy from NB Power's Point Lepreau Nuclear Generating Station ("Point Lepreau") and an agreement for the purchase of capacity and system energy from NB Power delivered via four submarine cables owned by the Province of PEI. Through various contracts with the PEI Energy Corporation, the Company purchases the capacity and energy from 92.5 megawatts ("MW") of wind generation on PEI.

Maritime Electric is a public utility subject to the PEI Electric Power Act ("EPA" or "Act"). As a public utility, the Company is subject to regulatory oversight and approvals of the Commission. IRAC's jurisdiction to regulate public utilities is found in the Electric Power Act and the Island Regulatory and Appeals Commission Act.

4.2 Purpose

The main purpose of this Application is to propose changes to Maritime Electric's customer rate structures to achieve RTC ratios within the 95 to 105 per cent range for all rate classes in a reasonable period of time as ordered by the Commission in Orders UE19-08 and UE20-06. The rate changes put forth for Commission approval in this Application are based on the conclusions of the Company's independent expert, Mr. Robert Boutilier, P. Eng. in the Company's comprehensive Rate Design Study filed with the Commission on June 30, 2020. The Application also considers underlying principles of rate design and the potential role of innovation in rate design.

4.3 History

In its September 27, 2019 GRA Order UE19-08, the Commission directed Maritime Electric, among other things, as follows:

- Submit a "Comprehensive Rate Design Study and Proposed Rate Structure" by June 30, 2020; and
- The proposed rate structure will provide RTC ratios between 90 per cent and 110 per cent with a longer-term goal of reaching 95 per cent to 105 per cent.

In Order UE20-06 issued on December 21, 2020, the Commission directed in regard to rate setting that:

- Maritime Electric is required to file with the Commission, and obtain approval for a new rate structure, prior to the filing of its next GRA. The approved rate structure will be incorporated into the next GRA, so that it can take effect in the next rate-setting period (Order paragraph 31).
- The rate structure proposed by Maritime Electric must ensure that the RTC ratios are within 95 to 105 within a reasonable period of time (Order paragraph 32).
- The Commission expects that the new rate structure will not only allow the Company to collect revenue in an equitable manner, but will also consider new and innovative rate structures that may provide tangible benefits to its customers (Section 14.5, paragraph 20.3).

4.4 Fundamental Principles of Rate Design

Rate design is a complex issue that requires the application of multiple principles that sometimes by their very nature are conflicting. The proposals in this Application are in keeping with the following fundamental principles of rate design[1]:

1. Recovery of cost of service – The aggregate of all customer rates and revenue must be sufficient to recover the utility's cost of service;

[1] Principles of Public Utility Rates by Dr. James Bonbright are used by regulators and utilities to assess the reasonableness of proposed rates and rate structures.

2. Fair apportionment of costs among customers and appropriate cost recovery should be reflected in rates;
3. Price signals that encourage efficient use and discourage inefficient use of electricity;
4. Customer understanding and acceptance;
5. Practical and cost effective to implement while sustainable to meet long-term objectives;
6. Customer rate stability with impacts to customers being managed;
7. Revenue stability; and
8. Avoidance of undue discrimination by enhancing and maintaining interclass equity.

These widely accepted principles are not considered in any particular order but are considered by the Company with varying levels of importance based on its experience and judgement to identify rate design issues and propose solutions to those issues.

4.5 Role of the Electricity Sector in Sustainability

As Canada transitions to a more carbon-neutral economy, utilities and regulators alike are working toward policies to harmonize the industry with a sustainable environment. Provincial Government policy continues to promote electrification of home heating and transportation to lower carbon emissions, meet target greenhouse gas emission reductions and promote a sustainable future on PEI. For Maritime Electric, electrification offers both opportunities for growth as well as challenges including how to meet the increased demand for energy with low emission (or ideally carbon neutral) sources of supply, improve the reliability of the grid in light of climate change and increased customer reliance on electricity in their daily lives while keeping customer rates fair and reasonable. The Company is continuing to monitor best practices within the industry as the transition of the energy sector toward zero emissions evolves.

5.0 TIMING OF GENERAL RATE APPLICATION

Under the EPA, the Commission is directed to set rates, tolls and charges for electric service that are "reasonable, publicly justifiable and non-discriminatory" and in doing so, balance the interests of both ratepayers and Maritime Electric.

When considering Bonbright's principles from the Company's perspective, the concept of fair, just and reasonable has two central components:

1. The rates provide for the right to a fair and timely opportunity to recover costs that are prudently incurred to provide service to customers. Such costs include operating costs, depreciation, cost of debt, and taxes; and
2. The rates provide for the right to a fair and timely opportunity to earn a reasonable return on the capital invested.

Together these components form the Company's annual Revenue Requirement.

As a regulated utility, Maritime Electric must apply to the Commission to seek approval for changes to customer rates. In a GRA, the Company puts forth its annual Revenue Requirement to the Commission for approval. In the absence of changes to the overall rate structure (or rate design changes), the rate increases required to recover the annual Revenue Requirement from customers can be recovered equally from all classes. This has been the approach used and approved by the Commission since 2004. The Company is planning to file its next GRA later this year for rates effective March 1, 2022.

When considering Bonbright's principles from a ratepayer perspective, regulators and utilities strive to ensure customer rates are as low as possible, understandable, do not change dramatically over a reasonable period of time and do not give one class of customer unfair advantage over another class.

Rate design is a process by which the Company determines the specific rates to charge to each customer class. Ideally, the rates are designed such that the revenue recovered from each

customer class based on their usage closely matches the cost of providing service to that class. However, exact matching of revenue to costs is seldom achieved and reasonable inequities are not uncommon in the utility industry.

Recent Maritime Electric Cost Allocation Studies have identified that some customer classes are over-recovering their allocated costs while others are under-recovering. The fact that such inequities exist is a concern that needs to be addressed and the purpose of this Application is to put forth a plan to address these inequities. However, it does not mean that the current rates, which were approved by the Commission to allow the Company to recover its Revenue Requirement, are not "reasonable, publicly justifiable and non-discriminatory".

In Order UE20-06, paragraph 31, the Commission ordered the Company to file and obtain approval for a new rate structure prior to filing its next GRA. Due regulatory process requires adequate time for the Commission staff to review the rate design changes put forth in this Application. The 2017 Cost Allocation Study was extensively reviewed by the Commission's expert, Multeese Consulting Incorporated, during its review of the 2018 GRA. The 2017 Cost Allocation Study was also a key component of the Boutilier Study prepared by Maritime Electric's independent expert. The findings of both experts were not fundamentally different and are the basis of the Stage 1 rate changes put forth in this Application. As such, the Commission may not require the assistance of an additional expert to review this Application. However, if an expert is so engaged by the Commission, additional time will be required for the expert's review. In addition, public notice and an opportunity for public consultation must be given. Commission review and public consultation will require adequate time for interrogatories, comments, expert reports (if required) and rebuttal. If deemed necessary by the Commission, a hearing may also be required. It is, therefore, unlikely that there is sufficient time remaining in the 2021 calendar year to have this Application approved in advance of filing the Company's next GRA for March 1, 2022 rates.

While the Company recognizes the Commission's desire to have a rate design plan in place in advance of the next GRA filing, the Commission has an obligation under Section 24 of the EPA to provide the Company a fair and reasonable opportunity to recover prudently incurred costs and earn a reasonable return on the capital invested by the shareholder. To achieve this, the Commission must review and make a decision in a timely manner on the Company's proposed

annual Revenue Requirement and set rates sufficient to recover this annual Revenue Requirement each year. In following Bonbright's principles[2], this decision-making process should be conducted independently of a rate design proceeding.

Further, the Stage 1 rate design changes in this Application can be approved independently of a GRA. Stage 1 rate changes are recommended to begin on March 1, 2022; however, if the regulatory due process requires additional time for review and approval, the rate design changes can be implemented on March 1, 2023 or later, in addition to any GRA rate changes approved by the Commission. In observance with Bonbright's principle 4, keeping the customer rate design Application proceeding separate from that of a GRA can make the reasons behind the two (inequities in cost recovery between customer classes versus increases in annual revenue requirement) easier for customers to understand and accept than blending the two together in one proceeding.

Recommendation

The Company is requesting a variance from paragraph 31 of Order UE20-06 under Section 12 of the Island Regulatory and Appeals Commission Act to permit the Company to file its next GRA prior to, and independent of, the Commission's process and decision on the rate design proposals.

[2] Separating rate design proceedings from a General Rate Application proceeding is supported by Bonbright's principles 1, 4, 5, 6 and 7.

6.0 BOUTILIER STUDY

6.1 Introduction

In response to the direction in Order UE19-08 to provide a comprehensive rate design study, Maritime Electric retained the consulting services of Mr. Robert P. Boutilier, P. Eng. in December 2019. The Boutilier Study was filed with the Commission on June 30, 2020, and provided discussion and commentary regarding:

- The nature and composition of electric rate classes;
- The types of electric rate components, their purposes and general usage by type of class;
- Comparison of Maritime Electric class and rate structures with selected Canadian utilities; and
- Recommended changes to Maritime Electric tariffs.

6.2 Boutilier Conclusions

The Boutilier Study had seven main conclusions:

1. The Residential Rate must increase to bring its RTC ratio into the 95-105 range. The General Service Rate must decrease to also fall within this range.
2. The declining second block Residential energy rate should be phased out by increasing the charge over a suitable but short period of time until it is equivalent to the first block charge, and then eliminated.
3. Large farms should be offered the choice of being served under this modified Residential tariff or moving to the Small Industrial tariff.
4. The Residential Urban and Rural service charges should be set to be the same, based on the Urban charge as proposed by Maritime Electric.
5. The interval metering projects already underway by Maritime Electric relating to farm load and more detail regarding Residential and General Service customers should continue with data archived and analyzed. This information should prove useful for further future cost causation and rate analysis.

6. When sufficient metering data is available, Maritime Electric should consider splitting its General Service class into subgroups which may be more homogeneous in nature and provide more accurate relationships between costs and revenues.
7. There is little to no predictable variation in Maritime Electric's contracted energy procurement costs within a calendar year. As a result of this stability, there is little benefit in Maritime Electric introducing broad based TOU rates at this time. Such rates are usually designed to target predictable or probable periods of cost variance. However, as electric-intensive technologies such as at-home charging of electric vehicles are adopted, opportunities to develop targeted TOU rates should be considered.

6.3 Maritime Electric's Response to Boutilier's Conclusions

In Section 8.0 of this Application the Company addresses Boutilier's conclusions one through three. Conclusion four is addressed in Section 9.1 of this Application.

With respect to conclusions five and six, the Company is continuing to gather interval data through the current Residential and General Service Load Studies, as discussed in Section 9.2 of this Application. A minimum of two years of data is considered desirable to support future cost allocation and rate design proposals. March 2020 is the first full month of hourly load data from the General Service meters and, therefore, two years of data will be available for analysis in March 2022[3].

In conclusion seven Boutilier considered innovative rates, specifically TOU rates. The Boutilier Study explored the benefits of TOU rates and the circumstances that warrant their implementation. The Boutilier Study noted that, given Maritime Electric's contractual annual fixed price arrangements for the supply of power and lack of predictability around unforeseen external variances in its energy supply or capacity costs, there is no overriding

[3] Given that the first full month of hourly data for the General Service meters coincides with the onset of the COVID-19 pandemic, which has had a significant negative impact on General Service customers, more than two years of data may be needed to adequately study usage patterns of this class depending on how quickly the economy recovers from the pandemic.

benefit to hourly-varying TOU rates at this time. The implications of conclusion seven is further discussed in Section 9.4 of this Application.

7.0 CUSTOMER CONSULTATION

7.1 Purpose

In keeping with Bonbright's principle 4, *customer understanding and acceptance*, Maritime Electric initiated a consultation process with the farm community with a meeting with the PEI Federation of Agriculture Executive in July, 2020[4]. The purpose of this process was to discuss the results of the Company's Farms Load Study[5], the elimination of the Residential declining second block rate, and obtain feedback on how best to continue to update and consult the farming community. At subsequent meetings it was agreed that, since COVID-19 restrictions presented challenges to holding public meetings, the Company would seek feedback from the farming community through an online survey.

7.2 Survey Results

Maritime Electric developed the survey in cooperation with the PEI Federation of Agriculture and the Dairy Farmers of PEI with the assistance of Dr. Bobby Cameron, the Director of Agriculture and Land Strategic Policy and Evaluation with the Government of PEI. The survey consisted of two sections. The first section collected information about farm type and operation to provide context for the survey results. The second section indicated the range of bill increases for rate design impacts and sought feedback and comments on this issue as well as energy conservation measures implemented by farms.

The PEI Federation of Agriculture communicated with their members via email to solicit feedback and participation from the membership. The survey was available online for response from December 3, 2020 to January 11, 2021. Responses were received from all sectors of the farming community. In total, responses were received from 159 farms, which represented a 29 per cent response rate. The PEI Federation of Agriculture Executive considered this the most substantial response received for a survey of farms to date on issues related to the Federation.

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4 This consultation process was initially planned for early in 2020 but was delayed due to the onset of the COVID-19 pandemic.

5 A draft of the Company's Farms Load Study was provided as Appendix C to the Comprehensive Rate Design Study filed on June 30, 2020. The final Farms Load Study is attached hereto as Appendix A.

The responses expressed strong concerns about additional rate increases to farming operations. Of the 102 farmers that responded regarding a phased-in plan for removal of the declining second block rate, approximately 70 per cent indicated a preference for a five-year or longer period for implementation. In addition, there were over 30 comments in the survey responses from members expressing concerns on the range of possible rate increases.

The survey results also included the following:

- An expressed need for more energy conservation education and incentives for farms. Approximately 60 per cent of respondents want more information on energy conservation technology and programs.
- Respondents see renewable energy as an opportunity for PEI farms. Approximately 87 per cent of respondents do not produce renewable energy on their farm, and approximately 60 per cent of respondents are interested in learning more.
- The lack of access to three phase power is perceived by some as a barrier for further energy conservation.

The survey results were shared with the PEI Federation of Agriculture in aggregate form. In addition, Maritime Electric provided an in-person presentation of the survey results to:

- Minister Bloyce Thompson (January 25, 2021);
- PEI Federation of Agriculture Board of Directors (January 26, 2021);
- Minister Steven Myers (January 27, 2021);
- Dairy Farmers of PEI Board of Directors (January 28, 2021); and
- PEI Federation of Agriculture AGM (January 29, 2021).

Similar to the survey results, concerns about the impact of potential rate design proposals on the farming community were expressed at these meetings.

The detailed survey results are provided in Appendix B.

On April 15, 2021 a follow-up meeting was held with representatives from the Federation of Agriculture and all of its member farm organizations across the Island. At the meeting, attendees from the farming community again expressed their concern about the impact of potential increases to rates on their livelihood, the farms load study data and the Boutilier Study. The Company outlined the timing and process for regulatory filings including the Customer consultation phase and encouraged attendees to take part in this process.

7.3 Implications

The Company appreciates the participation of the Island farming community in the stakeholder consultation process and is committed to continuing consultations with farm customers, the PEI Federation of Agriculture and its member organizations throughout this process. The Company has considered the results of the survey and stakeholder consultations in the rate proposals put forth in this Application. In addition, the Company is investigating the feasibility of further expansion of three phase distribution lines which some farms identified in the survey as a barrier to energy conservation.

8.0 RATE PLAN

8.1 Summary of Rate Plan[6]

This Rate Plan proposes the correction of the RTC ratios in two stages. Stage 1 involves:

- Phasing out the Residential declining second block energy charge by increasing it to be the same as the first block energy charge in four equal steps (i.e. over four years) beginning on March 1, 2022;
- A rate increase for the Large Industrial class to bring its RTC ratio into the 95 per cent to 105 per cent target range over one year on March 1, 2022;
- A rate increase for the Street Lighting classes to bring their RTC ratios into the 95 per cent to 105 per cent target range over two years on March 1, 2022 and March 1, 2023; and
- The additional revenue collected from the Residential, Large Industrial, and Street Lighting classes be offset by a corresponding decrease in revenue and rates for the General Service class.

The implementation of Stage 1 over four years is designed to generally limit annual increases in customers' bills to five per cent to minimize rate shock for those customers most significantly impacted by these changes[7]. Table 1 is a summary of Maritime Electric's proposed Stage 1 steps and timing.

TABLE 1
Stage 1 Rate Plan

Step	Implementation Date	Eliminate Residential Declining Second Block	Move Large Industrial RTC to 97.7%	Move Street Lighting RTC to 97.8%
1	March 1, 2022	Step 1 of 4	Step 1 of 1	Step 1 of 2
2	March 1, 2023	Step 2 of 4		Step 2 of 2
3	March 1, 2024	Step 3 of 4		
4	March 1, 2025	Step 4 of 4		

[6] All rate proposals set out in this rate design plan are independent of any general rate increases required to recover changes to the Company's revenue requirement to be set out in a future GRA.

[7] A limited number of customers will experience annual rate increases in excess of five per cent.

Stage 2 will begin post-March 1, 2025 and will address the remaining shortfall in the Residential and General Service RTC ratios. Sections 8.8 and 8.9 of this Application discusses options on how this may be achieved as well as the uncertainties and additional considerations that may influence the selection of the best option for proceeding in Stage 2.

8.2 2017 Cost Allocation Study Results

The starting point for developing a rate plan to comply with Commission orders is the 2017 Cost Allocation Study, which is Maritime Electric's most recent Cost Allocation Study. The resulting RTC ratios are summarized in Table 2.

TABLE 2
Summary of 2017 Cost Allocation Study Results

	2017 Energy Sales (GWh)	2017 Allocated Costs ($000s) A	2017 Base Revenue ($000s) B	RTC Ratios (%)[8] C = B/A	Within Required RTC Range
Residential	505.2	91,806	83,860	91.3	No
Residential (Farms)	52.3	8,372	6,868	82.0	No
Residential subtotal – year-round customers	**557.5**	**100,178**	**90,728**	**90.6**	No
Residential (Seasonal)	19.5	4,512	4,309	95.5	Yes
Residential subtotal	**577.0**	**104,690**	**95,037**	**90.8**	No
General Service	375.6	47,880	58,152	121.5	No
General Service (Seasonal)	9.3	1,565	1,766	112.8	No
General Service subtotal	**384.9**	**49,445**	**59,918**	**121.2**	No
Small Industrial	88.2	11,402	11,675	102.4	Yes
Large Industrial	150.0	14,115	13,205	93.6	No
Street Lighting	5.5	2,558	2,331	91.1	No
Unmetered	2.4	390	407	104.4	Yes
TOTALS	**1,208.0**	**182,600**	**182,573**		

[8] Table 2, and the rest of this Application, shows the RTC ratios to the nearest 0.1 per cent in order to illustrate the changes in the RTC ratios at each step of the rate plan. This should not be taken as an indication of the level of precision for the RTC ratios. In the 2017 Cost Allocation Study, the RTC ratios are shown rounded to the nearest 1 per cent, which is more appropriate given the assumptions and estimates involved in the analysis.

Order UE20-06 requires Maritime Electric to achieve RTC ratios within a target range of 95 per cent to 105 per cent for each rate class. Table 2 shows that General Service is above 105 per cent while Residential, Large Industrial and Street Lighting are below 95 per cent. To move the General Service RTC ratio to 105 per cent or less will involve recovering less revenue from General Service customers. Likewise, to move the Residential, Large Industrial and Street Lighting RTC ratios to 95 per cent or more will involve recovering more revenue from those customers. To remain revenue neutral, the proposals in this Application will balance the required revenue decrease with the revenue increases.

It should be noted that RTC ratios can change if and when there are changes in the allocated costs. A Cost Allocation Study is a systematic method of allocating the utility's total costs for a year among the various rate classes. The methodology involves estimates, with the greatest level of uncertainty associated with estimates of peak loads for some of the rate classes. Much of Maritime Electric's fixed costs are a function of peak loads, and these fixed costs are allocated to the rate classes based on their peak loads.

The resulting RTC ratios are derived from the 2017 Cost Allocation Study and while achieving RTC ratios equal to 100 per cent is the ideal, given the estimates involved in a Cost Allocation Study, a target range of 95 per cent to 105 per cent for RTC ratios is considered reasonable.

8.3 Residential Load Study Preliminary Results

To better understand Residential customer usage patterns and the impacts of potential rate changes, the Company is currently performing a two year Load Study on the Residential class[9].

Table 3 provides a summary of the RTC ratios for the Load Study cohorts of year-round Residential customers based on the 2017 Cost Allocation Study, the preliminary results

[9] A similar Load Study on General Service Customers is also underway with the meters for this study installed in early March 2020. The Company is currently analyzing the General Service Load Study results for the 2020/2021 winter peak to determine similar usage patterns for the General Service Rate Class.

from a Residential Load Study that is currently underway, and results from the Farms Study.

TABLE 3
Preliminary Residential Load Study - Analysis of Year-round Residential Cohorts[10]

Cohorts[11]	Number of Customers	Energy Sales (GWh)	2017 Allocated Cost ($000s) A	2017 Base Revenue ($000s) B	RTC Ratio (%) C = B/A
1. Usage up to 2,300 kWh	53,474	410.1	73,135	70,902	96.9
2. Usage 2,301 to 5,000 kWh	7,017	150.6	26,102	21,367	81.9
3. Domestic >5,000 kWh	293	11.6	2,070	1,463	70.7
4. Farms >5,000 kWh	418	42.5	5,663	4,816	85.0
5. Other[12] >5,000 kWh	45	10.5	1,752	1,140	65.1
Combined	**61,247**	**625.3**	**108,722**	**99,688**	**91.7**

Table 3 demonstrates that Residential customers with consumption less than 2,300 kWh per month (i.e., consumption primarily within the first block) are within the RTC ratio target range and confirms that the elimination of the declining second block rate should be the initial priority to correct the Residential RTC ratio.

Another observation to note from the preliminary load study results in Table 3 is that the combined RTC ratio of the year-round customers in the Residential class of 91.7 is better than the 2017 study result of 90.6[13]. The 2017 Cost Allocation Study was based on load study data prepared from 1992-1994 and the slightly improved RTC ratio identifies a change in the load study results over the intervening period since 1994.

The preliminary Residential load study results indicate that a lower apportionment of costs should be attributed to the Residential class. The reason for this change is that the

[10] Analysis was based on the 12-month period of March 2019 to February 2020. Seasonal customers were not included in the analysis as only a small percentage of them initiate second block usage charges and, therefore, they would not materially influence the results.

[11] Stratum boundaries were selected to minimize the confidence interval and maximize the accuracy for the estimates of load that are derived from the load study meter data and therefore do not correlate with the second block threshold of 2,000 kWh.

[12] Customer accounts that are not farms or household uses of electricity. Two thirds of the usage in this cohort is accounted for by the six largest loads, which are two cannabis industry operators, three fish farms and one greenhouse operation. There are also a number of churches and premises providing lodging with nine beds or less as permitted under the Rates and General Rules and Regulations to be included in the Residential Class.

[13] The RTC ratio of year-round Residential customers (excluding seasonal Residential customers) from Table 2 – Summary of 2017 Cost Allocation Study Results is 90.6.

preliminary load study results indicate a relatively smaller estimate of coincident peak ("CP") and non-coincident peak ("NCP") demands resulting in a smaller allocation of demand related costs to the Residential class relative to the load data used in preparation of the 2017 Cost Allocation Study. The Company's total cost of providing service in 2017 has not changed and the costs not attributable to the Residential class should be attributable to one or more of the remaining classes. Given the size of the General Service class in comparison to the remaining classes, for illustration purposes, the Company has assumed that these costs should be assigned to this class.

Table 4 shows the revised 2017 Cost Allocation Study RTC ratios based on the preliminary Residential load study data with $1,228,000 of costs reassigned to the General Service class from the Residential class.

TABLE 4
Summary of 2017 Cost Allocation Study Results Adjusted for Preliminary Residential Load Study Results

Customer Class	Original 2017 Allocated Costs ($000s) A	2017 Costs Reallocated to General Service Due to Preliminary Residential Load Study Results B	Updated 2017 Allocated Costs ($000s) C = A+B	2017 Base Revenue ($000s) D	RTC Ratios (%) E = D/C	Within Allowed RTC Range
Residential	91,806	(1,125)	90,681	83,860	92.5	No
Residential (Farms)	8,372	(103)	8,269	6,868	83.1	No
Residential subtotal – year-round customers	**100,178**	**(1,228)**	**98,950**	**90,728**	**91.7**	No
Residential (Seasonal)	4,512		4,512	4,309	95.5	Yes
All Residential subtotal	**104,690**	**(1,228)**	**103,462**	**95,037**	**91.9**	No
General Service	47,880	1,189	49,069	58,152	118.5	No
General Service (Seasonal)	1,565	39	1,604	1,766	110.1	No
General Service subtotal	**49,445**	**1,228**	**50,673**	**59,918**	**118.2**	No
Small Industrial	11,402	-	11,402	11,675	102.4	Yes
Large Industrial	14,115	-	14,115	13,205	93.6	No
Street Lighting	2,558	-	2,558	2,331	91.1	No
Unmetered	390	-	390	407	104.4	Yes
TOTALS	**182,600**	**-**	**182,600**	**182,573**		

8.4 Elimination of the Residential Class Declining Second Block

While the rate design changes proposed in this Application address the fundamental RTC ratio inequities of all rate classes, there are two classes with RTC ratios that are significantly outside the target range. The Residential and General Service classes have RTC ratios that are at opposite ends of the target range and, as such, the revenue impact of balancing the Residential RTC ratio can be used to balance the General Service RTC ratio. Therefore, this section of the Application will focus on the Residential class.

One of the primary reasons that the current Residential RTC ratio is too low is its declining second block rate. The Residential class has a first block rate for energy consumption up to 2,000 kWh per month and a lower (i.e., declining) second block rate for energy consumption in excess of 2,000 kWh per month. The declining second block rate has long been identified as a fundamental inequity in the Company's current rate structure. Thus, the elimination of the declining second block rate is a primary objective of this Application's Stage 1 recommendations.

The elimination of the declining second block rate will result in larger rate increases for Residential customers with energy consumption in excess of 2,000 kWh per month. To understand how the elimination of the declining second block rate will impact customers with various levels of energy consumption, the Company divided the Residential class into cohorts based on energy consumption and recalculated the RTC ratios for these cohorts.

To begin, the Company estimated the revenue increase that will result from the elimination of the declining second block rate and that is summarized in Table 5.

TABLE 5 Analysis of Year-round Cohorts with the Declining Second Block Eliminated						
Cohorts	**Updated 2017 Allocated Cost from Table 4 ($000s) A**	**2017 Base Revenue from Table 4 ($000s) B**	**2017 Base Revenue – Declining Second Block Eliminated ($000s) C**	**Incremental Revenue from Elimination of Declining Second Block ($000s) D = C - B**	**Increase in Revenue (%) E = D/B**	**Revised 2017 RTC Ratio (%) F = C/A**
1. Usage up to 2,300 kWh	73,135	70,902	71,155	253	0.4	97.3
2. Usage 2,301 to 5,000 kWh	26,102	21,367	22,228	861	4.0	85.2
3. Domestic >5,000 kWh	2,070	1,463	1,631	168	11.5	78.8
4. Farms >5,000 kWh	5,663	4,816	5,788	972	20.2	102.2
5. Other >5,000 kWh	1,752	1,140	1,414	274	24.0	80.7
TOTAL	**108,722**	**99,688**	**102,216**	**2,528**	**2.5**	**94.0**

Table 5 demonstrates that the elimination of the declining second block in Stage 1 will result in an overall RTC ratio for the year-round Residential customers of approximately 94 per cent[14]. Note that the remaining RTC ratio gap of one percent is addressed in Section 8.8 of this Application.

In addition, Table 5 demonstrates that the elimination of the declining second block will result in rate increases for farms and other (non-domestic) Residential customers in excess of 20 per cent. Such a rate increase in a single year would clearly violate Bonbright's principle four, *customer understanding and acceptance*, and five, *customer rate stability with impacts to customers being managed*. Therefore, the Company does not recommend the elimination of the declining second block rate in a single year.

The next step is to determine a reasonable period of time over which the declining second block should be eliminated. Commission expert Mr. Mel Whalen, P. Eng., in his report (the "Multeese Report") to the Commission filed on May 23, 2019, recommended that the Residential declining second block rate be increased in three steps (i.e., over three years) to be equal to the first block rate. Maritime Electric considered this recommendation and the result is that cohorts 4 and 5, farms and other (non-domestic) customers with consumption greater than 5,000 kWh per month, would encounter annual rate increases

[14] The 2017 base revenue – second block eliminated (Table 5 – Column C) assumes all year-round Residential customers remain in the Residential class and does not consider farm and other non-domestic customers who are eligible to opt to move to the Small Industrial class as discussed in Section 8.5 of this Application.

in the range of 6.7 to 8.0 per cent, respectively, in each of the three years barring any other changes to their usage patterns.

The Company then considered eliminating the declining second block rate in four steps (i.e., over four years). The result is that farms and other (non-domestic) customers would encounter annual rate increases in the range of 5.1 to 6.0 per cent, respectively, in each of the four years barring any other changes to their usage patterns.

Finally, the Company considered eliminating the declining second block rate in five steps (i.e., over five years). The result is that farms and other (non-domestic) customers would encounter annual rate increases in the range of 4.0 to 4.8 per cent, respectively, in each of the five years barring any other changes to their usage patterns.

Recommendation

Maritime Electric recommends increasing the Residential class declining second block rate to equal the first block rate in four equal steps (i.e., over four years) beginning on March 1, 2022. This recommendation is supported by Bonbright's principle 5, which is consistent with the principle of gradualism[15], acknowledges the feedback received from the farming community, and achieves the elimination of the declining second block in a reasonable period of time as required by the Commission Order UE20-06.

8.5 Eligibility of Farms for the Small Industrial Rate Class

Boutilier's third conclusion, that large farms should be offered the choice of being served under either the Residential or Small Industrial class, potentially offers a way to mitigate the impact of the elimination of the Residential declining second block on larger farm customers.

In assessing Boutilier's third conclusion, the Company needed to understand the impact of farm customers moving to the Small Industrial class versus remaining in the Residential class, after the elimination of the declining second block. To demonstrate the range of

[15] The ratemaking principle of gradualism is when electric utilities adjust rates in smaller increments over time to avoid customer rate shock.

potential electricity bill impacts, the energy usage of 50 potato farms and 30 dairy farms, from the Farms Study attached herein as Appendix A, was analyzed.

The analysis first involved estimating the electricity bills and resulting rate increase if the farm customers stayed on the Residential rate after the elimination of the declining second block compared to the Residential rate before the elimination of the declining second block. Second, the electricity bills were estimated along with the resulting rate increase if the farm customers moved to the Small Industrial rate compared to the Residential rate before the elimination of the declining second block. Both results were plotted on the following charts according to energy usage and rate increase.

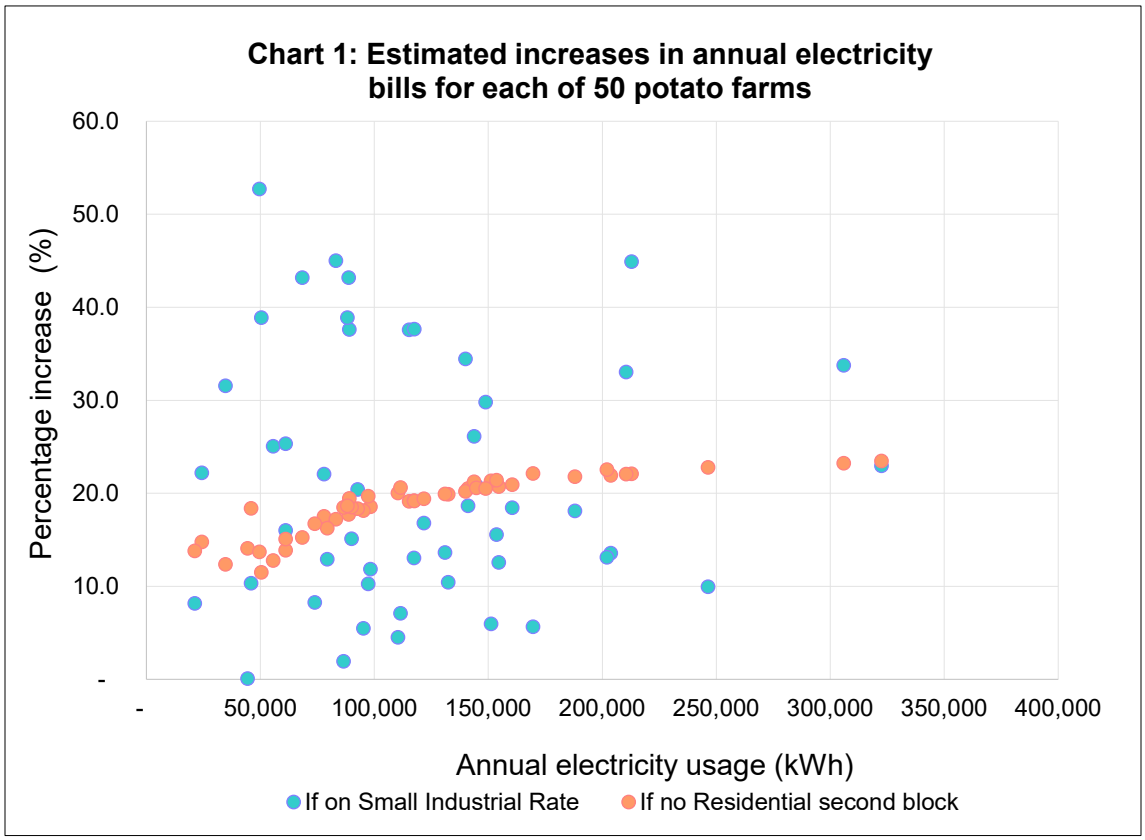


Chart 1 demonstrates that some potato farm customers would have lower electricity bills under the Small Industrial class while some would have higher electricity bills. This result indicates it would be more beneficial if potato farm customers are given the choice of being billed under either the Residential or Small Industrial classes.

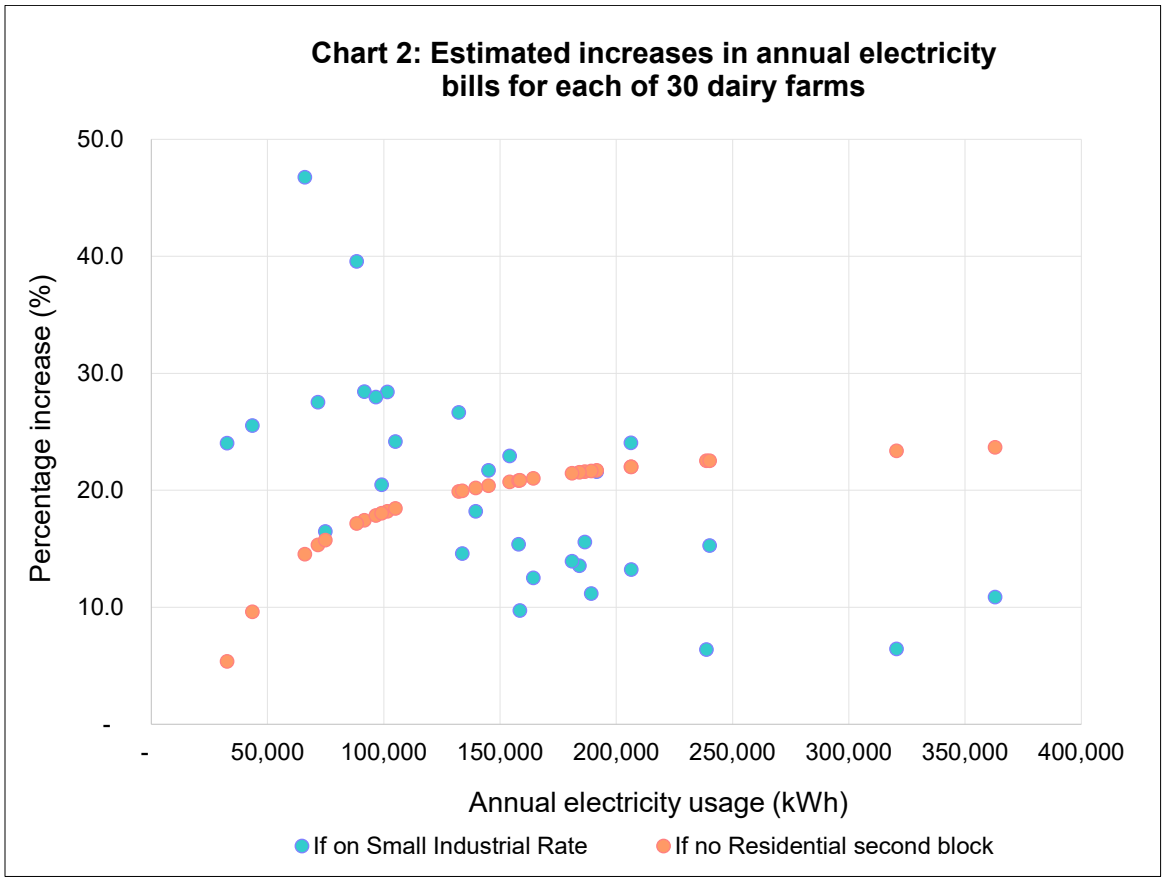


Chart 2 demonstrates that the dairy farm customers with higher electricity usage generally would have lower electricity bills under the Small Industrial class while those with lower electricity usage would have higher electricity bills. This result also indicates it would be more beneficial if dairy farm customers are given the choice of being billed under either the Residential or Small Industrial classes.

From this analysis, the Company estimates that approximately 45 per cent of farm customers with consumption greater than 5,000 kWh per month would move to the Small Industrial class if eligible.

Recommendation

Maritime Electric recommends that farm customers be eligible under both the Residential and Small Industrial classes.

To implement eligibility for farm customers under the Small Industrial class, the Small Industrial Rate Application Guidelines in Section N-8 of the Rates and General Rules and Regulations will need to be updated. The following wording should be added to the "Division E Manufacturing Industries" after "In Addition: …"

> *"Agricultural farming operations are eligible for service under this rate. If there is a residence(s) on the same property as the farming operation, the residence(s) must be metered separately and billed under the Residential Rate."*

In addition, the Company estimates that approximately 75 per cent of other (non-domestic) Residential customers with consumption greater than 5,000 kWh per month are eligible for service under the Small Industrial class. After step two of the elimination of the declining second block is implemented on March 1, 2023, it will be more advantageous for those customers to move to the Small Industrial class.

In Table 6, the preliminary Residential Load Study results, previously shown in Table 5 in Section 8.4, are adjusted to reflect large farms and other eligible large Residential customers moving to the Small Industrial class after step two of the elimination of the declining second block.

TABLE 6 Analysis of Year-round Load Study Cohorts with the Declining Second Block Eliminated and Eligible Residential Customers Move to Small Industrial						
Cohorts	**2017 Allocated Cost from Table 5 ($000s) A**	**2017 Base Revenue from Table 5 ($000s) B**	**2017 Base Revenue – Declining Second Block Eliminated ($000s) C**	**Incremental Revenue from Elimination of Declining Second Block ($000s) D = C - B**	**Increase in Revenue (%) E = D/B**	**Revised 2017 RTC Ratio (%) F = C/A**
Usage up to 2,300 kWh	73,135	70,902	71,155	253	0.4	97.3
Usage 2,301 to 5,000 kWh	26,102	21,367	22,228	861	4.0	85.2
Domestic >5,000 kWh	2,070	1,463	1,631	168	11.5	78.8
Farms >5,000 kWh Remaining in Residential	2,814	2,328	2,779	451	19.4	98.8
Other >5,000 kWh Remaining in Residential	438	305	356	51	16.7	81.3
Subtotal – Year-round Customers remaining in Residential	**104,559**	**96,365**	**98,149**	**1,784**	**1.9**	**93.9**
45% Farms >5,000 kWh to Small Industrial	2,850	2,488	2,748	260	10.5	96.4
75% Other >5,000 kWh to Small Industrial	1,313	835	947	112	13.4	72.1
TOTAL of Year-Round Residential	**108,722**	**99,688**	**101,844**	**2,156**	**2.2**	**93.7**

Table 6 demonstrates that the overall RTC ratio for year-round customers in the Residential class will be approximately 93.9 after elimination of the declining second block and eligible customers move to the Small Industrial class.

8.6 Other Rate Classes

The Boutilier Study advised that, apart from Residential and General Service classes, Maritime Electric's other rate classes are generally satisfactory. Maritime Electric agrees and does not propose structural changes to these other rate classes. However, as was shown in Table 2, both the Large Industrial and Street Lighting classes have RTC ratios below the target range. The rates charged for these two classes can be increased to correct their RTC ratios[16].

[16] The proposed changes to the Large Industrial and Street Lighting classes will bring their RTC ratios to 97.7 per cent and 97.8 per cent, respectively. This is higher than the lower threshold of 95 per cent. However, these are comparable to the RTC ratios required for Residential and Small Industrial classes in order to bring the General Service class RTC ratio within range as discussed in Section 8.8.

Revenue collected from the Large Industrial class would need to increase by $584,000 annually and equates to a 4.4 per cent rate increase. Revenue collected from the Street Lighting classes would need to increase by $172,000 annually and equates to a 7.4 per cent rate increase. The incremental revenue would allow for a corresponding decrease in revenue and rates for the General Service class.

Recommendation

Maritime Electric recommends increasing the Large Industrial rate by 4.4 per cent in one step on March 1, 2022 to bring the RTC ratio of this class to approximately 97.7 per cent as the resulting rate increase is less than 5 per cent.

For the Street Lighting rates, the Company recommends increasing the rates by 7.4 per cent in two equal steps beginning on March 1, 2022 to bring the RTC ratio of this class to approximately 97.8 per cent. Increasing the Street Lighting rates in two steps will limit the annual increase to no more than five per cent.

This will bring the RTC ratios of both classes within the target range.

Maritime Electric recommends that additional revenue recovered from the Residential, Large Industrial and Street Lighting classes be offset by a corresponding reduction in the General Service class rate in each of four annual steps of Stage 1 such that the overall impact is revenue neutral to the Company.

8.7 Impact of Stage 1

Table 7 summarizes the estimated annual changes in 2017 revenue between the rate classes as a result of Stage 1 of this rate design plan.

Table 7
Summary of Stage 1 Impact on 2017 Cost Allocation Study Revenue

Customer Rate Class	Step 1 March 1, 2022 ($000s) A	Step 2 March 1, 2023 ($000s) B	Step 3 March 1, 2024 ($000s) C	Step 4 March 1, 2025 ($000s) D	Stage 1 Total ($000s) E = A+B+C+D	Stage 1 Total Revenue Change (%)
Residential: Usage 0 to 2,300 kWh	61	60	60	60	241	0.4
Usage 2,300 to 5,000 kWh	205	205	205	205	820	4.0
Domestic >5,000 kWh	40	41	40	40	161	11.5
Farms >5,000 kWh	107	107	108	107	429	19.4
Farms >5,000 kWh to Small Industrial	124	124	-	-	248	10.5
Other >5,000 kWh	12	12	12	13	49	16.7
Other >5,000 kWh to Small Industrial	54	53	-	-	107	13.4
Residential Subtotal	**603**	**602**	**425**	**425**	**2,055**	**2.2**
Large Industrial	584	-	-	-	584	4.4
Street Lighting	86	86	-	-	172	7.4
General Service	(1,273)	(688)	(425)	(425)	(2,811)	(4.9)
Total	**-**	**-**	**-**	**-**	**-**	**-**

Table 8 provides the expected 2017 Cost Allocation Study RTC ratios upon implementing Stage 1.

TABLE 8
Estimate RTC Ratios after Stage 1

	2017 Allocated Costs			2017 Base Revenue				
	Table 4 – Column C 2017 Allocated Costs ($000s) A	2017 Cost of Customers move from Res to SI ($000s) B	Stage 1 2017 Allocated Costs ($000s) C = A+B	Table 4 – Column D 2017 Base Revenue ($000s) D	Base Revenue Changes of Customers Move from Res to SI ($000s) E	Stage 1 Changes to Revenue ($000s) F	Stage 1 2017 Revenue ($000s) G = D+E+F	Stage 1 RTC Ratios (%) H = G/C
Residential	90,681	(1,265)	89,416	83,860	(903)	1,378	84,335	94.3
Residential (Farms)	8,269	(2,744)	5,525	6,868	(2,620)	677	4,925	89.1
Subtotal – Year-round Residential	**98,950**	**(4,009)**	**94,941**	**90,728**	**(3,523)**	**2,055**	**89,260**	**94.0**
Residential (Seasonal)	4,512	-	4,512	4,309			4,309	95.5
Residential Subtotal	**103,462**	**(4,009)**	**99,453**	**95,037**	**(3,523)**	**2,055**	**93,569**	**94.1**
General Service	49,069	-	49,069	58,152	-	(2,811)	55,341	112.8
General Service (Seasonal)	1,604	-	1,604	1,766	-		1,766	110.1
General Service Subtotal	**50,673**	**-**	**50,673**	**59,918**	**-**	**(2,811)**	**57,107**	**112.7**
Small Industrial	11,402	4,009	15,411	11,675	3,523	-	15,198	98.6
Large Industrial	14,115	-	14,115	13,205	-	584	13,789	97.7
Street Lighting	2,558	-	2,558	2,331	-	172	2,503	97.8
Unmetered	390	-	390	407	-	-	407	104.4
TOTALS	**182,600**	**-**	**182,600**	**182,573**	**-**	**-**	**182,573**	

Table 8 demonstrates that Stage 1 is expected to bring the RTC ratios for the Large Industrial and Street Lighting classes within the target range and improve the RTC ratios for the Residential and General Service classes. Additional measures are required to fully bring the RTC ratios for the Residential and General Service classes within the target range of 95 to 105 per cent.

8.8 Impact of Stage 2

As discussed in Section 8.1 of this Application, Stage 1 rate increases recommended for the Residential class were designed to manage the annual rate increase as close to five percent as possible and effect change in a reasonable period of time. As a result, Stage 2 will be required to close the remaining gap in the RTC ratios for the Residential and General Service classes.

As shown in Table 9, General Service revenue will need to be further reduced by approximately $3.9 million in order to bring its RTC ratio down to the upper limit of 105 per cent. To achieve this and remain revenue neutral on an overall basis, revenue from the Residential class will need to increase by the same amount. The result is expected to bring the Residential RTC ratio to approximately 98 per cent. This is above the lower limit of 95 per cent but consistent with the RTC ratios expected to be achieved for the Small Industrial, Large Industrial and Street Lighting rate classes in Stage 1.

TABLE 9
STAGE 2 IMPACT

	2017 Allocated Costs ($000s) A	Stage 1 Adjusted Revenue ($000s) B	Stage 2 Changes to Revenue ($000s) C	Stage 2 Adjusted Revenue ($000s) D = B+C	Change in Revenue (%) E = C/B	Adjusted RTC Ratios (%) F = D/A
Residential	89,416	84,335	3,313	87,648	3.9	98.0
Residential (Seasonal)	4,512	4,309	112	4,421	2.6	98.0
Residential (Farms)	5,525	4,925	476	5,401	9.7	97.8
Residential subtotal	**99,453**	**93,569**	**3,901**	**97,470**	**4.2**	**98.0**
General Service	49,069	55,341	(3,819)	51,522	(6.9)	105.0
General Service (Seasonal)	1,604	1,766	(82)	1,684	(4.6)	105.0
General Service subtotal	**50,673**	**57,107**	**(3,901)**	**53,206**	**(6.8)**	**105.0**
Small Industrial	15,411	15,198	-	15,198	-	98.6
Large Industrial	14,115	13,789	-	13,789	-	97.7
Street Lighting	2,558	2,503	-	2,503	-	97.8
Unmetered	390	407	-	407	-	104.4
TOTALS	**182,600**	**182,573**	**-**	**182,573**		

8.9 Benefits of a Staged Approach

There are a number of benefits to implementing a staged approach to rate design.

First, it allows the Residential declining second block to be eliminated evenly over a four-year period in a simple and uncomplicated manner that will be easy for customers to understand, observing Bonbright's fourth principle, *customer understanding and*

acceptance. Secondly, it manages the impacts to customers over a reasonable period of time in accordance with Bonbright's principle 6.

Finally, and perhaps most important, a staged approach allows an appropriate amount of time to assess the impact of potentially changing cost allocations and/or energy consumption patterns before initiating Stage 2 of this Application. Such considerations are discussed below; however, the key implication is that a rate design plan should have some flexibility to address changing conditions and finalizing Stage 2 too early may result in an unnecessary overcorrection of the RTC ratios.

The recommendations proposed in this Application are influenced by the results of the 2017 Cost Allocation Study, being the most recent cost allocation study completed. While this study is three years old, it is still an appropriate basis for the Company's recommendations as it is unlikely that future study results will indicate that the rate design changes proposed in this Application are not necessary. More specifically, the issue of the Residential declining second block rate will not change with an updated cost allocation study, supporting the Stage 1 recommendations. However, as indicated in Section 8.3, preliminary Residential load study data suggests that the apportionment of costs between the General Service and Residential classes may change in the next cost allocation study. If this assumption proves correct and the costs allocated to the various rate classes do change then the proposed revenue adjustments for Stage 2 can incorporate these results.

Another consideration that could impact rate design proposals for Stage 2 is the impact that Stage 1 rate changes will have on customers' energy consumption. While the proposals set out in this Application assume that energy consumption will remain consistent with the 2017 Cost Allocation Study, price elasticity of demand[17] could change customer behaviour patterns impacting the revenues collected from the various customer classes. This is supported by the farm consultation results that indicated that farm operators need time to assess the impact on their business and consider energy conservation and renewable energy program options to reduce their energy consumption.

[17] Price elasticity of demand is a basic principle of economics defined as the measurement of the change in consumption of a product in relation to a change in its price.

Furthermore, if the Commission approves the recommendation to allow farm customers to be eligible for service under either the Residential or Small Industrial classes, the RTC ratios of each rate class may be impacted. This impact has been estimated in this Application based on the preliminary Residential load study and farm study results but the actual extent of that impact cannot be accurately determined at this time.

Public policy promoting the electrification of home heating and transportation on the Island may also have an impact on energy consumption and rate design. Electrification is considered a good means to reduce dependence on fossil fuels and reduce carbon emissions. Electrification of home heating through the EfficiencyPEI Heat Pump Rebate Program continues. In addition, the Province recently announced significant rebates on the purchase of electric and hybrid vehicles. On the one hand, electrification in and of itself will increase revenue and improve RTC ratios over time. However, significant increases in Residential rates could slow participation in these programs or even cause consumers to revert back to fossil fuels if the price signal is too great. It is therefore important to consider the impact of any future rate design proposals on electrification and the Provincial policy which has established targets for reducing greenhouse gas emissions.

Recommendation

Given the uncertainty discussed above, the Company is not seeking approval of Stage 2 at this time. Instead, the Company is proposing the following:

1. Continue to review and analyze the metering data from the load study participants to improve load study results and the impacts of Stage 1 on customer consumption, with any material results incorporated in the final recommendations for Stage 2;
2. Complete a 2023 Cost Allocation Study to be filed with the Commission in 2024. This study will assess the impact of the first two steps of the Stage 1 rate changes on the RTC ratios and more accurately measure the remaining gaps to be addressed by Stage 2; and

3. On or before December 31, 2024, the Company will file specific rate recommendations for Stage 2 for Commission approval to be implemented beginning in 2026.

9.0 ADDITIONAL CONSIDERATIONS AND EMERGING TRENDS

9.1 Residential Monthly Service Charge

In the 2018 GRA, Maritime Electric proposed that the Residential Rural monthly service charge of $26.92 be reduced to $24.57, to be the same as the Residential Urban service charge. The Commission did not approve this proposal.

Maritime Electric still believes that a single Rural and Urban service charge is best. However, it is not being recommended in this Application for two reasons.

1. Decreasing the Rural service charge to be the same as the Urban service charge would result in a decrease of approximately $1 million of annual revenue collected from Residential customers. This would be counter-productive to the plan to correct the RTC ratios that involves increasing the amount of revenue collected from Residential customers in order to offset corresponding decreases in revenue collected from General Service customers.
2. Significant capital investment will be required for a new billing system and a potential conversion to advanced metering infrastructure ("AMI"), which would largely be classified as customer-related costs. In the Residential rate, customer-related costs are recovered through the monthly service charge and thus there may be a need to increase the service charge in the near term. Maritime Electric expects that it will again propose a single service charge when the magnitude of these cost increases is better known.

9.2 Changes to General Service Rate

In the Boutilier Study, Mr. Boutilier noted that there is a large range of load sizes served under the existing General Service class, and recommended that consideration be given to restructuring this class into two or more classes, based on load size. However, Mr. Boutilier also suggested that such a review would have to wait until sufficient load data became available from the current Load Study.

As discussed in Section 6.3, March 2020 is the first full month of hourly load data from the General Service sample meters; unfortunately, this also coincided with the onset of the COVID-19 pandemic. The Company has just recently accumulated twelve full months of hourly data and this data is currently being analyzed to better understand General Service customer usage patterns. However, given that General Service sales were the most negatively impacted by the pandemic it is reasonable to assume that the first twelve months of data would not be considered typical or representative of the class. It would be beneficial to have two or three years of data, depending on the time needed to recover from the pandemic, to fully understand normal General Service usage patterns and make meaningful recommendations as to whether to proceed with the rate changes proposed by Mr. Boutilier.

9.3 Impact of Net Metering

Continued uptake of solar generation net metering by both Residential and General Service customers will have an increasing impact on rates. At the end of 2020, there were 701 solar net metering customers contracted on Maritime Electric's system, totaling 6.6 MW of installed solar capacity, with approximately 59 per cent of these (representing 3.8 MW of solar capacity) being installed in 2020. There is no indication that this recent trend of solar uptake is going to abate as customers continue to take advantage of governmental subsidies.

Net metering customers are credited the full retail rate for the energy they displace behind their own meter, as well as for the energy they export into Maritime Electric's system. The full retail rate includes both energy supply costs (which are variable) and system delivery costs (which are fixed, and includes infrastructure costs such as poles, wires, and substations). Net metering customers pay little or none of the demand related fixed costs associated with their service resulting in these costs being recovered from all other customers in their rate class. The implication being that as additional net metering is added to the system, higher rates will have to be charged to the Residential class as a whole in order to maintain a RTC ratio within the target range. Residential class net metering impacts are further discussed in Appendix D.

In 2019, the Government of PEI introduced legislation that would have permitted enhanced net metering for farms and municipalities. This legislation ultimately did not get approved. Taken as written, this legislation could have a significant impact on the General Service class if there was a large uptake from municipalities. Similar to existing net metering customers in the Residential class, a General Service net metering customer would benefit through avoidance of paying their portion of demand related fixed costs and by extension a non-participating General Service customer would not benefit. In addition, if municipal streetlights become eligible for net metering, further analysis would be required to ensure an appropriate rate is set. A large portion of the streetlight rate is for infrastructure and fixed costs, and a much smaller portion is for the energy supply costs, especially for the newer LED streetlights.

Maritime Electric is not alone in this issue. Utilities across North America are dealing with similar trends and studying net metering compensation methodologies that are fairer to all customers. Maritime Electric will continue to monitor industry trends in this area as well as the amount of fixed cost avoidance by its net metering customers, and will continue to provide the Commission with updates regarding the level and rate impacts of net metering. Maritime Electric may propose different rate structures for net metering customers in the future.

9.4 Innovative Rates

In Order UE20-06, the Commission emphasized that the new rate structure to be proposed by Maritime Electric must be comprehensive, not solely focus on correcting inequities in the RTC ratios, and consider new and innovative rate structures that may provide tangible benefits to its customers.

Maritime Electric engaged an independent expert, Mr. Boutilier, to provide a comprehensive review of the Company's rate structure, including an assessment of the nature and composition of the rate classes, and a comparison of Maritime Electric's rate classes and structures with other Canadian utilities, resulting in recommended changes. Those recommended changes are summarized in the seven conclusions repeated in Section 6.2 of this Application.

The Boutilier Study did not identify or recommend any new and innovative rate structures for Maritime Electric's rate classes. In fact, conclusion seven in the Boutilier Study advised against the implementation of TOU rates at this time.

Innovative rate structures are generally implemented to send a specific price signal to customers. The Boutilier Study indicated that TOU rates can be beneficial when the cost of supplying power varies significantly between peak and off-peak times, or even from hour to hour. TOU rates can send effective and efficient price signals upon which customers may choose to modify their consumption behaviour.

Maritime Electric's current energy supply comes from four sources: (i) the Point Lepreau Nuclear Generating Station; (ii) wind produced on Island; (iii) NB Energy Marketing via a long-term energy purchase agreement; and (iv) energy produced by Maritime Electric-owned generation under limited circumstances. The unit cost of the first three energy sources is contractually fixed on an annual basis, while the overall energy costs from Maritime Electric-owned generation is generally immaterial on an annual basis. As a result, the Company's current energy supply costs do not vary significantly between peak hours and off-peak hours and the Boutilier Study did not consider TOU rates to be beneficial for customers at this time.

The Boutilier Study did indicate that time-based rate structures may be beneficial in the longer term in the management of system peak demand. Electrification of transportation could lead to a significant rise in peak load if customers charge their vehicles at the end of the standard work day, which will coincide with the timing of the typical daily peak. Incentives and technology will likely be required to encourage transportation charging in off-peak hours, minimizing the need to add system infrastructure to accommodate this potential trend. Maritime Electric is currently analyzing the growth of such technologies to determine when such price signals may be needed to distribute load and avoid increases in peak demand.

Apart from the fact that the Boutilier Study did not recommend TOU rates at this time, Maritime Electric's ability to investigate and propose new and innovative rate structures is

limited by technology. There are essentially two technological requirements before new and innovative rate structures can be studied, designed and implemented: (i) AMI; and (ii) a billing/customer information system ("Billing/CIS") that is compatible with AMI[18].

AMI refers to meters that are capable of recording a customer's energy usage every five minutes[19], in addition to many other customer service related technological advances such as remote connects/disconnects and automatic outage notification. Recording energy usage hourly would allow a utility to identify those times of day where energy usage is the highest and lowest and then design TOU rates to incentivize customers to modify their consumption patterns to correspond to the utility's purchased energy price structure. A compatible Billing/CIS is necessary to accumulate the hourly data from the AMI meters, allow aggregation and analysis of that data, and then bill customers at different TOU rates. Maritime Electric currently has neither of these technological requirements but does have a plan to address this deficiency.

Before delving into Maritime Electric's technological plan, it is important to point out the significant cost of AMI and a compatible Billing/CIS, which has been a key factor in the timing of the Company's plan. An estimate for a compatible Billing/CIS is in the range of $20 million and to purchase and install AMI meters for every customer is in the range of $30 million. The existing Billing/CIS is at the end of its useful life and must be replaced. The Company continues to develop a cost/benefit analysis for AMI meters with the expectation that the results will support the investment as being in the best interest of customers in the near term.

Maritime Electric's current Billing/CIS was custom-built in the late 1980s, with an expected service life of 20 years. To the benefit of customers, investments over the years extended the service life to over 30 years. The risks associated with continuing to operate a Billing/CIS that is functionally obsolete are too great, and in the 2021 Capital Budget Application Maritime Electric requested approval to spend $330,000 to engage technical

[18] A key component of a compatible CIS is a meter data management repository ("MDMR") system, which is a long-term storage repository for AMI data.

[19] While the meter can read usage every five minutes, the utility can record usage at longer intervals (e.g., every hour) to manage data storage.

expertise in the development of a plan to replace the Billing/CIS. The replacement of the Billing/CIS is the necessary first step in obtaining the technological requirements for innovative rates. Maritime Electric expects to file evidence with the Commission to support and request approval of a multi-year plan to replace its obsolete Billing/CIS with a new Billing/CIS that will also be compatible with AMI meters in a Supplemental Capital Budget Application later this year.

Maritime Electric is also conducting research to determine which AMI system will provide the greatest future benefit to customers. In 2022, Maritime Electric expects to file evidence with the Commission and request approval of a multi-year plan to purchase and install AMI meters for every customer.

10.0 CONCLUSION

In Order UE20-6, the Commission directed the Company to propose changes to its current rate structure to achieve RTC ratios within the range of 95 to 105 per cent over a reasonable period of time. This begs the question of what constitutes a "*reasonable period of time".* The Company believes that there must be a balance between making measurable strides toward meeting the ultimate goal of having RTC ratios for all classes in the 95 to 105 range without placing undue hardship on the customers most affected by these changes. The Company is confident that the changes proposed in this Application achieve this balance.

The elimination of the declining second block rate is a primary objective of Stage 1 of this Application and is in keeping with a number of the Bonbright's fundamental rate design principles:

- A more fair apportionment of costs will be recovered from Residential customers through rates;
- More appropriate pricing signal for Residential customers to conserve energy rather than encouraging higher consumption as under the current rate structure;
- The Company has undergone several stakeholder consultations with higher consumption Residential users including farms to ensure they understand the impact of these changes and why this change is necessary. The Company will continue to work with these customers;
- Elimination of declining second block is practical and cost effective to implement as it requires essentially no capital investment or lead time to implement;
- A four year phase-in of these changes supports the principle of gradualism as it will manage the impact to customers of this change and minimize rate shock by keeping annual increases to higher consumption Residential customers within a 5 per cent range;
- It provides revenue stability for the utility in that the additional revenue from the Residential class can be used to offset proposed changes to the General Service class rates (i.e. revenue neutral).
- It promotes avoidance of discrimination by enhancing and maintaining interclass equity as recent load study data indicates that lower consumption cohorts (<2,300 kWh per month) in the Residential class are already within or close to the 95 to 105 RTC range.

As noted above, the elimination of the Residential declining second block along with proposed changes to Large Industrial and Street Lighting rates will provide additional revenue that can be used to lower the General Service class rates whose RTC ratio has historically far exceeded the higher RTC threshold of 105 per cent. Similar to the proposed changes to increase rates for other classes, reducing General Service rates over the four year period is in keeping with the fundamental rate design principles including:

- A more fair apportionment of costs will be recovered from General Service customers through rates;
- Reducing existing General Service rates is a practical and cost effective way to address the existing inequity in General Service rates compared with other rate classes with essentially no capital investment or lead time to implement.

Additional rate design changes will be required after Stage 1 is completed to bring the Residential and General Service RTC ratios within the target range of 95 to 105. Over the intervening period, the Company will keep the Commission informed of the impact of Stage 1 rate changes, the results of the ongoing Residential and General Service load studies, and investigation into new technologies to support TOU rates in the longer term. Finally, the Company will file a rate plan for Stage 2, to begin in 2026, to address the remaining RTC ratio gap.

11.0 PROPOSED ORDER

C A N A D A

PROVINCE OF PRINCE EDWARD ISLAND

BEFORE THE ISLAND REGULATORY
AND APPEALS COMMISSION

IN THE MATTER of Section 10, 13(1) and 20 of the *Electric Power Act* (R.S.P.E.I. 1988, Cap. E-4) and **IN THE MATTER** of the Application of Maritime Electric Company, Limited for an order approving a four year rate design plan for Stage 1 changes to Residential, General Service, Large Industrial and Street Lighting classes for electric service commencing on March 1, 2022 and for certain approvals incidental to such an order.

AND

IN THE MATTER of Section 12 of the *Island Regulatory and Appeals Commission Act* (R.S.P.E.I. 1988, Cap. 1-11) and **IN THE MATTER** of the Application of Maritime Electric Company, Limited for an order varying paragraph 31 of Order UE20-06 and for certain approvals incidental to such an order.

WHEREAS on or about September 27, 2019 the Island Regulatory and Appeals Commission (the "Commission") issued UE19-08;

AND WHEREAS pursuant to UE19-08 the Commission ordered that Maritime Electric Company, Limited (the "Company") shall file, on or before June 30, 2020, a comprehensive rate design study and proposed rate structure, as set out in this Order;

AND WHEREAS the Commission also ordered that the rate structure shall ensure that all rate classes have a revenue-to-cost ("RTC") ratio within a range of 90-110 per cent;

AND WHEREAS the Commission deemed that a RTC ratio of 95 per cent to 105 per cent to be the appropriate target range for each of the Company's rate classes and must be used by the Company for all rate classes commencing March 1, 2022, a RTC range of 90 per cent to 110 per cent is an appropriate short to medium term goal for the Company;

AND WHEREAS on or about June 30, 2020, the Company filed with the Commission a comprehensive rate design study prepared by an independent expert Robert P. Boutilier, P.Eng. outlining key findings and recommendations to change the Company's rate structure;

AND WHEREAS the onset of the COVID-19 pandemic in March, 2020 prevented Maritime Electric from performing stakeholder consultations which is considered a necessary step in developing a proposed rate structure to incorporate the Study findings given the magnitude of the energy cost increases that would be experienced by some customers;

AND WHEREAS on or about December 21, 2020 the Commission issued UE20-06;

AND WHEREAS in UE20-06 the Commission ordered the Company to file and obtain approval for a new rate structure prior to filing its next General Rate Application;

AND WHEREAS the Commission also ordered that the rate structure proposed by the Company must ensure that the RTC ratios are within the 95 to 105 range in a reasonable period of time;

NOW AND THEREFORE pursuant to the *Electric Power Act* and the *Island Regulatory and Appeals Commission Act*, the Commission orders as follows:

IT IS ORDERED THAT:

1. Paragraph 31 of Order UE20-06 is varied to allow the Company to file its next General Rate Application prior to receiving approval of the rate design changes set out in this Application.

2. Maritime Electric shall increase the Residential class declining second block rate to equal the first block rate in four equal annual steps beginning on March 1, 2022.

3. Maritime Electric shall allow farm customers to be eligible under both the Residential and Small Industrial classes.

4. The Rates and General Rules and Regulations Section N-8, Small Industrial Rate Application Guidelines, shall be updated with the following wording to be added to the "Division E Manufacturing Industries" after "In Addition: …"

   "Agricultural farming operations are eligible for service under this rate. If there is a residence(s) on the same property as the farming operation, the residence(s) must be metered separately and billed under the Residential Rate."

5. Maritime Electric shall increase the Large Industrial rate by 4.4 per cent in one step on March 1, 2022 to bring the RTC of the class to approximately 97.7 per cent.

6. For the Street Lighting rates, the Company shall increase the rates by 7.4 per cent in two equal steps beginning on March 1, 2022 to bring the RTC of this class to approximately 97.8 per cent.

7. The additional revenue recovered from the Residential, Large Industrial and Street Lighting classes as a result of paragraphs 2, 5 and 6 above shall be offset by a corresponding reduction in the General Service class rate in each of the four annual steps of Stage 1 such that the overall impact is revenue neutral to the Company.

8. The Company shall provide annual updates to the Commission, beginning on June 30, 2022, on the Residential and General Service load studies results as the metering data analysis from the load study participants becomes available and the impacts of Stage 1 on customer consumption, with any material results incorporated in the final recommendations for Stage 2;

9. The Company shall file with the Commission a 2023 Cost Allocation Study on or before June 30, 2024. This study will assess the impact of the first two steps of the Stage 1 rate changes on the RTC ratios and more accurately measure the remaining gaps to be addressed by Stage 2; and

10. On or before December 31, 2024, the Company shall file specific rate recommendations for Stage 2 for Commission approval considering technological advancements achieved and other relevant data and analysis. Stage 2 recommendations shall be implemented beginning in 2026.

DATED at Charlottetown this ____ day of _____, 2021

BY THE COMMISSION

_____

_____, Chair

_____

_____, Commissioner

_____

_____, Commissioner

All our energy.
All the time.

MARITIME ELECTRIC
A FORTIS COMPANY

FARM STUDY

TABLE OF CONTENTS

Executive Summary

The context for this Farm Study is the direction by the Island Regulatory and Appeals Commission ("IRAC") to eliminate the lower price for the second energy block in Maritime Electric's Residential Rate. Currently electricity usage in excess of 2,000 kWh per month (the declining second block) is charged at a lower price than for usage up to 2,000 kWh per month.

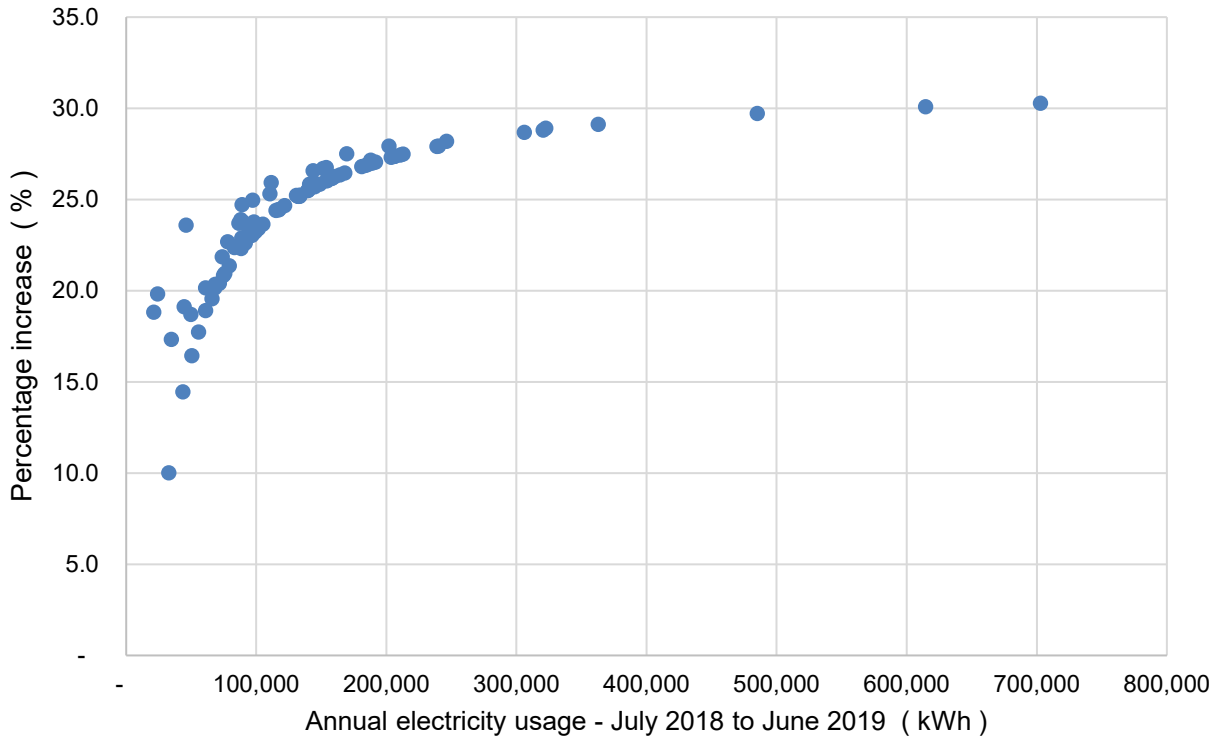
A second consideration is the direction by IRAC to increase the Revenue-to-Cost ("RTC") ratio for the Residential Rate class to at least 0.95. Maritime Electric operates under cost of service regulation, which means that the rates are intended to recover the cost of providing service. The 2017 Cost Allocation Study estimated the RTC ratio for year round Residential customers to be 0.91, which means that these customers as a class are paying 91 per cent of the estimated cost to provide their electricity. To get to 0.95, which is the low end of the 0.95 to 1.05 range established by the Commission, would require an increase in total class revenue of approximately 5 per cent as calculated in Table 1 below.

TABLE 1
Revenue Increase Required to Achieve RTC Ratio of 0.95 for the Residential Class

		($000s, except %)
2017 costs allocated to Residential (per Table 2 in the Application)	A	$ 104,690
Revenue required to achieve RTC ratio of 95%	B = A x 0.95	99,455
2017 base revenue (per Table 2 in the Application)	C	95,037
Revenue difference	D = C – B	4,418
Resulting rate increase to achieve RTC ratio of 95%	E = D/C	4.6%

An impediment to eliminating the declining second block has been that farms are eligible for service under the Residential Rate, with no limit on the amount of electricity used. Elimination of the declining second block would result in increases in electricity bills in excess of 25 per cent for some large farms. Chart 1 shows the combined impact on bills for some of the larger farms of elimination of the declining second block plus an incremental rate increase applied across the class required to bring the RTC ratio of the Residential class to the minimum 0.95 per cent range.

Chart 1: Increase in bills for 87 larger farms due to proposed changes in Residential Rate



The purpose of this Farm Study was to investigate possible ways to mitigate the impact on large farms of the elimination of the second energy block in the Residential Rate.

To gain a better understanding of electricity usage by farms, in the first half of 2018 Maritime Electric installed meters capable of storing hourly load data at 87 of the larger farms on Prince Edward Island ("PEI"). Based on the first 12 months (July 2018 to June 2019) of hourly data, the estimated RTC ratio for farm load is 0.86. For the second 12 months (July 2019 to June 2020) of hourly data, the estimated RTC ratio is 0.88. These values are higher than the estimate of 0.82 for Farms in the 2017 Cost Allocation Study, but are still below the target range of 0.95 to 1.05.

Maritime Electric also engaged in consultation with farmers through the PEI Federation of Agriculture and the Dairy Farmers of PEI ("DFPEI") from July 2020 to March 2021. Due to COVID-19 restrictions, a general public meeting with farmers was not possible. As an alternative, in cooperation with the executive of the two farming organizations, Maritime Electric conducted an

on-line survey of the farming community to get their input on the proposed changes to rates as well as on other energy-related issues. The survey responses reflected:

- A desire to have the rate changes phased in over a number of years; and
- A lack of access to three phase power is considered an issue for a significant number of farms.

Maritime Electric's Small Industrial class is recommended as an appropriate alternative for large farms. The Small Industrial rate has a demand charge and a first energy block that is sized in proportion to the monthly metered demand.

Maritime Electric recommends that farms be given the option of moving to the Small Industrial class. Approximately half of large farms for which hourly data was collected would be better off moving to the Small Industrial class. Their bill increases would be mostly in the 10 per cent to 20 per cent range compared to 20 per cent to 25 per cent if they remained in the Residential class.

The other half of large farms would be better off staying on the Residential rate. They would experience bill increases mostly in the 15 per cent to 25 per cent range. However, for both groups these are still large increases. A phase in over several years is recommended, with increases due to these rate changes generally limited to 5 per cent annually. This would be in addition to and can be applied separately from any General Rate Application increases due to changes in the Company's annual Revenue Requirement.

1.0 Introduction

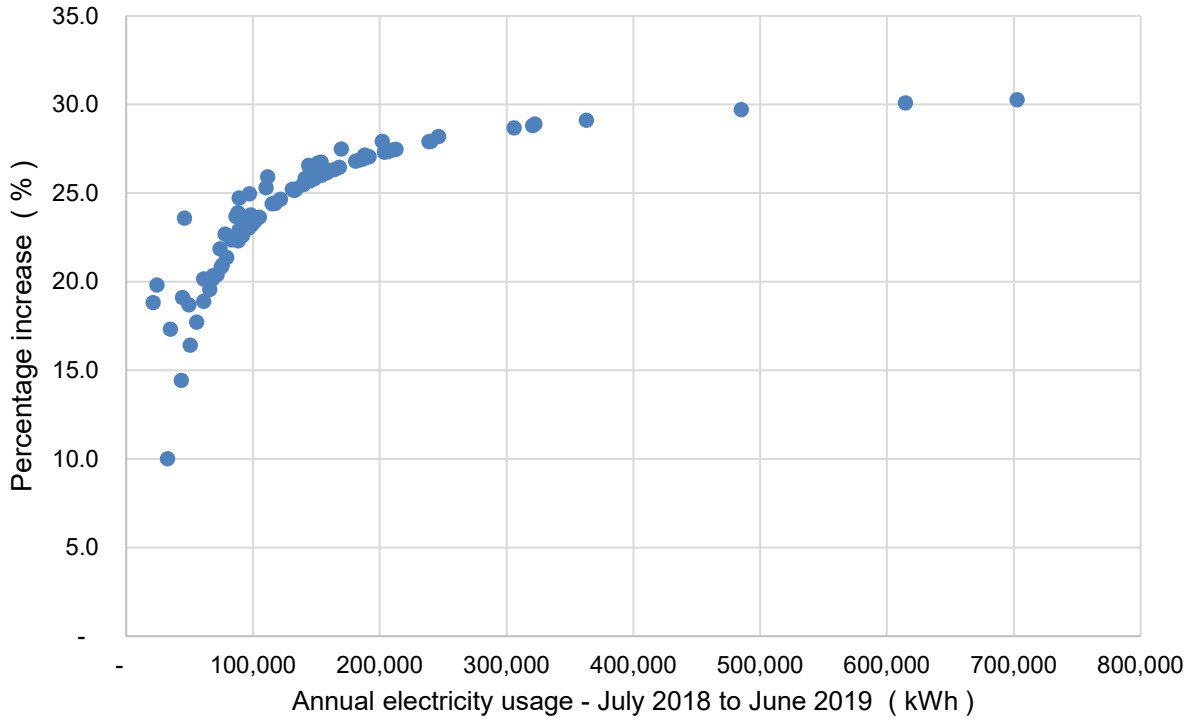
The context for this Farm Study is the direction by IRAC to eliminate the lower rate for the second energy block in Maritime Electric's Residential rate. Currently electricity usage in excess of 2,000 kWh per month (the declining second block) is charged at a lower rate than for usage up to 2,000 kWh per month.

A second consideration is the direction by IRAC to increase the RTC ratio for the Residential rate class to at least 0.95. Maritime Electric operates under cost of service regulation, which means that the rates are intended to recover the cost of providing service. The 2017 Cost Allocation Study estimated the RTC ratio for year round

Residential customers to be 0.91, which means that these customers are paying 91 per cent of the estimated cost to provide their electricity. To get to 0.95 (the low end of the 0.95 to 1.05 band considered to be satisfactory, given the assumptions and estimates involved in a Cost Allocation Study) would require an increase in revenue of about 4.6 per cent.

An impediment to eliminating the declining declining second block has been that farms are eligible for service under the Residential rate, with no limit on the amount of electricity used. Elimination of the declining second block would result in increases in electricity bills of up to 25 per cent for large farms. Chart 2 shows the combined impact on bills for some of the larger farms of elimination of the declining second block plus the 5 per cent increase in revenue to get to a 0.95 RTC ratio.

Chart 2: Increase in bills for 87 larger farms due to proposed changes in Residential Rate



The Farm Study also investigated possible ways to mitigate the impact on large farms of the elimination of the declining second block energy charge in the Residential rate. Much

of the effort went into developing a better understanding of electricity usage by farms, which then formed the basis for recommendations.

2.0 Estimates of farm electricity usage

The starting point for the Farm Study was estimating farm electricity usage. This involved the following four steps:

1. Analysis of monthly kilowatt-hour ("kWh") consumption data from Maritime Electric's billing system. This provided estimates of total monthly and annual electricity usage by farm type.
2. Top down estimate of annual electricity usage from energy intensity factors. This provided a check on the reasonableness of the results of step one.
3. Installation of meters at some of the larger farms to gather hourly load data.
4. Estimating coincident and non-coincident peak loads for farm load based on the hourly data from step three.

2.1 Analysis of monthly billing system data

For the preliminary draft Farm Study report[1] prepared in November 2019, the Standard Industrial Classification (SIC) code assigned to each account in Maritime Electric's billing system was used to identify farm customers.

There are approximately 2,200 Residential Rate accounts in the Maritime Electric billing system that have a farm (SIC) code assigned to them. In 2017 these accounts used a total of 52,329 MWh. The annual usage per customer covers a wide range, from more than 500,000 kWh per year to less than what a small household uses. The majority of these customers identified as farms have little or no declining second block energy usage, and thus would be minimally affected by the elimination of the second energy block.

The SIC codes assigned to farms in the Company's billing system have two shortcomings. The first is that they do not provide a breakdown by individual farm types, such as potato farms or dairy farms. The second shortcoming is that not all farms served under the

[1] This preliminary report was attached as Appendix C to the comprehensive Rate Design Study that was filed with the Commission on June 30, 2020.

Residential rate have been assigned a farm SIC code. However, for the 2017 Cost Allocation Study the best information available was used to analyze those farms assigned a farm ("SIC") code as a subset of the Residential rate class.

To improve on the results of the November 2019 draft report, a detailed analysis was done of all Residential rate accounts using more than 5,000 kWh for at least one month. This threshold was selected because:

- Few Residential rate customers use more than 5,000 kWh per month for domestic loads (i.e., household usage); and
- Most large farms use more than 5,000 kWh per month.

The results of this analysis are summarized in Tables 2 and 3 for the two years of this Study (July 2018 to June 2020).

TABLE 2
Residential Rate Farm Electricity Usage for July 2018 to June 2019
(for accounts with 5,001+ kWh usage for at least one month)

		Potato	Dairy	Hogs	Poultry	Total
Number of Residential accounts		353	143	9	15	520
Number of farms		174	136	9	13	332
Annual billed usage (MWh)	A	26,804	13,114	2,288	1,195	43,401
Portion of farms with household loads included (%)		50	75	75	75	
Estimated household usage included above in A (MWh) (based on 8,000 kWh per year)	B	696	816	54	78	1,644
Farm usage - total billed less household (MWh)	A - B	26,108	12,298	2,234	1,117	41,757

TABLE 3
Residential Rate Farm Electricity Usage for July 2019 to June 2020
(for accounts with 5,001+ kWh usage for at least one month)

		Potato	Dairy	Hogs	Poultry	Total
Number of Residential accounts		361	142	10	15	528
Number of farms		174	135	9	13	331
Annual billed usage (MWh)	A	31,598	12,887	2,634	1,199	48,318
Portion of farms with household loads included (%)		50	75	75	75	
Estimated household usage included above in A (MWh) (based on 8,000 kWh per year)	B	696	810	54	78	1,638
Farm usage - total billed less household (MWh)	A - B	30,902	12,077	2,580	1,121	46,680

The lower usage by potato farms for July 2018 to June 2019 (as compared to July 2019 to June 2020) is assumed to be due to poor harvest conditions in the Fall of 2019, which resulted in 10 per cent of the potato crop being left in the ground.

2.2 Top down estimate of annual usage from energy intensity factors

To check the reasonableness of the estimate of total farms electricity usage based on billing system data, a separate estimate of the electricity used by the farms was done using a top-down approach. The starting point was production statistics for PEI's agriculture sector. Electricity intensity factors were applied to the various production volumes to obtain estimates of annual electricity usage. Tables 4 and 5 show the results for 2018 and 2019.

TABLE 4
Estimated Farms Electricity Usage for 2018 Production

Type of crop/farming	Main uses for electricity	Intensity of electricity usage	2018 PEI Farming Statistics			Estimated electricity usage (MWh)
			Area harvested (acres)	Production quantity	Production units	
Potato:	Fan power for storage	kWh/tonne	79,200	(22.6 million cwt)		
- table/seed	cooling and ventilation	68	35%	360,000	tonnes	22,032
- processing		24	65%	668,000	tonnes	14,429
Grain crops:	Fan power for drying	kWh/tonne				
- wheat	and storage ventilation	13.3	40,000	60,800	tonnes	809
- barley		10.6	74,000	105,500	tonnes	1,118
- oats		10.6	10,000	9,900	tonnes	105
Soybeans	Fan power for drying and storage ventilation	5.6 kWh/tonne	38,700	43,200	tonnes	240
Dairy (milk)	Milk cooling, water heating, milking machine, ventilation	0.10 kWh/kg		121 million kg (121 million litres)		12,100
Hog	Ventilation and radiant heating	30 kWh/hog		72,100	hogs	2,163
Poultry - meat	Ventilation, lighting and feeding	0.23 kWh/kg		5.0 4.5 chicken	million kg	1,150
Poultry - eggs	Ventilation, lighting and feeding	0.21 kWh/dozen		3.8	million dozen	798
Total						**54,944**

For potatoes, the estimate is based on 10% of the crop being used directly from the field, with 90% going into storage.

TABLE 5
Estimated Farms Electricity Usage for 2019 Production

Type of crop/farming	Main uses for electricity	Intensity of electricity usage	2019 PEI Farming Statistics: Area harvested (acres)	Production quantity	Production units	Estimated electricity usage (MWh)
Potato:	Fan power for storage	kWh/tonne	84,000	(25.2 million cwt)		
- table/seed	cooling and ventilation	68	38%	435,000	tonnes	26,622
- processing		24	62%	710,000	tonnes	15,336
Grain crops:	Fan power for drying	kWh/tonne				
- wheat	and storage ventilation	13.3	38,800	60,800	tonnes	809
- barley		10.6	48,900	72,300	tonnes	766
- oats		10.6	10,000	10,100	tonnes	107
Soybeans	Fan power for drying and storage ventilation	5.6 kWh/tonne	39,200	36,400	tonnes	202
Dairy (milk)	Milk cooling, water heating, milking machine, ventilation	0.10 kWh/kg		117 million kg (117 million litres)		11,700
Hog	Ventilation and radiant heating	30 kWh/hog		78,800	hogs	2,364
Poultry - meat	Ventilation, lighting and feeding	0.23 kWh/kg		5.0 4.4 chicken	million kg	1,150
Poultry - eggs	Ventilation, lighting and feeding	0.21 kWh/dozen		3.9	million dozen	819
Total						**59,876**

For potatoes, the estimate is based on 10% of the crop being used directly from the field, with 90% going into storage.

Tables 4 and 5 demonstrate that potato farms are the largest user of electricity in PEI's agriculture sector, accounting for two thirds of electricity usage, with dairy farms being the second largest user.

Tables 6 and 7 compare the results of the two approaches to estimating Residential Rate farm electricity usage, and show that they are within 10 per cent of each other. The conclusion is that basing this Study on farms that use at least 5,000 kWh per month as identified in the billing system is a reasonable approach because it includes most of the electricity usage by farms in the Residential class. As well, it is the larger farms that will be most affected by the elimination of the Residential Rate second energy block.

TABLE 6
Comparison of Billed Electricity Usage with Intensity Factors Estimate
(July 2018 to June 2019)

Type of crop/ farming	Main uses for electricity	Billed residential usage less household usage (Table 2) (GWh)	Electricity usage for 2018 production (estimated using intensity factors)		
			Total (Table 4) (GWh) A	Less usage under GS or SI rates[2] (GWh) B	Balance assumed in Residential accounts (GWh) C = A - B
Potato	Fan power for storage cooling and ventilation	26.1	36.4	9.2	27.2
Dairy (milk)	milk cooling, hot water heating, milking machinery	12.3	12.1	-	12.1
Hog	Ventilation and radiant heating	2.2	2.2	0.4	1.8
Poultry/eggs	Ventilation, lighting and feeding	1.1	1.9	0.1	1.8
Grain crops	Fan power for drying and storage ventilation	Note 1	2.3	0.8	1.5
Total		**41.7**	**54.9**	**10.5**	**44.4**

Note 1: Immaterial consumption. Assumed to be usually included with the other loads on a farm.

[2] GS means General Service and SI means Small Industrial.

TABLE 7
Comparison of Billed Electricity Usage with Intensity Factors Estimate
(July 2019 to June 2020)

Type of crop/ farming	Main uses for electricity	Billed residential usage less household usage (Table 3) (GWh)	Electricity usage for 2018 production (estimated using intensity factors)		
			Total (Table 5) (GWh) A	Less usage under GS or SI rates[3] (GWh) B	Balance assumed in Residential accounts (GWh) C = A - B
Potato	Fan power for storage cooling and ventilation	30.9	42.0	8.3	33.7
Dairy (milk)	milk cooling, hot water heating, milking machinery	12.1	11.7	-	11.7
Hog	Ventilation and radiant heating	2.6	2.4	0.4	2.0
Poultry/eggs	Ventilation, lighting and feeding	1.1	2.0	0.1	1.9
Grain crops	Fan power for drying and storage ventilation	Note 1	1.9	0.8	1.1
Total		**46.7**	**60.0**	**9.6**	**50.4**

Note 1: Immaterial consumption. Assumed to be usually included with the other loads on a farm.

2.3 Installation of meters to gather hourly load data

In addition to energy usage, measured in kWh, it is important to identify the farm load that coincides with Maritime Electric's annual system peak load (referred to as CP, or Coincident Peak load), as well as the maximum load imposed on the grid by farms at any time during the year (referred to as NCP, or Non-Coincident Peak load).

To provide data for estimating farm CP and NCP loads, in the first half of 2018 Maritime Electric installed meters capable of storing hourly kWh load values at 87 of the larger farms, as follows:

[3] GS means General Service and SI means Small Industrial.

50 at potato farms
30 at dairy farms
3 at hog farms
4 at poultry farms
87

This Farm Study is based on the 24 months of data from July 2018 to June 2020, and thus the annual electricity quantities are from July to June. For potato farms, this happens to be a better match with farm production than the calendar year electricity usage. For potato farms, the crop year runs from July to June, and electricity usage for the crop harvested in the Fall includes electricity used for storage through to June of the following year.

The following four charts show how electricity usage varies through the 12 month period July 2018 to June 2019 for each of the four types of farms. Each chart shows the daily kWh consumption for the metered farms of that type. The usage by dairy, hog and poultry farms is generally consistent throughout the year, whereas the usage by potato farms appears to be largely a function of the quantity of potatoes in storage, with a minimum at the end of the summer and a peak in mid-November.

The corresponding charts for the period July 2019 to June 2020 are not shown because the data is consistent with the charts that follow.

Chart 3: Daily kWh usage for 50 potato farms for July 1, 2018 to June 30, 2019

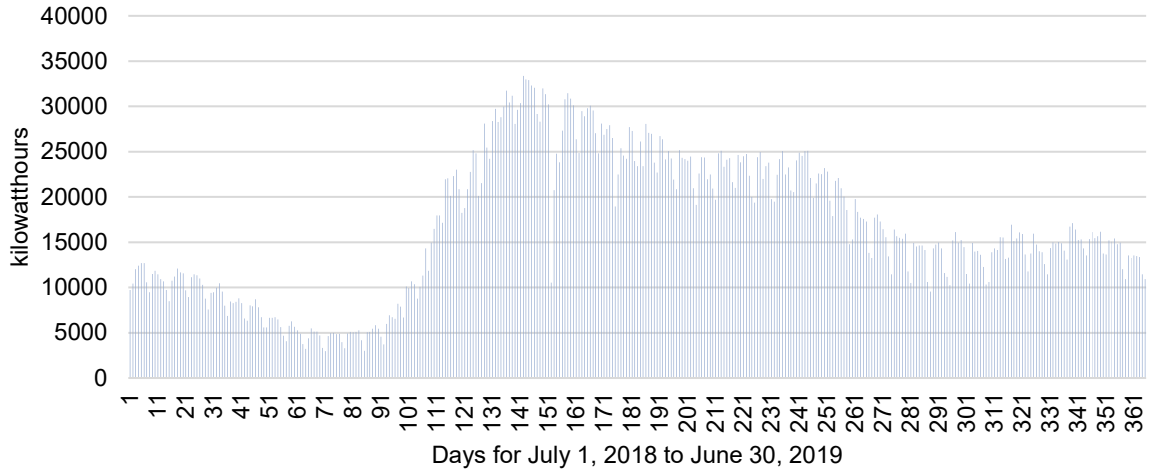


Chart 4: Daily kWh usage by 30 dairy farms for July 1, 2018 to June 30, 2019

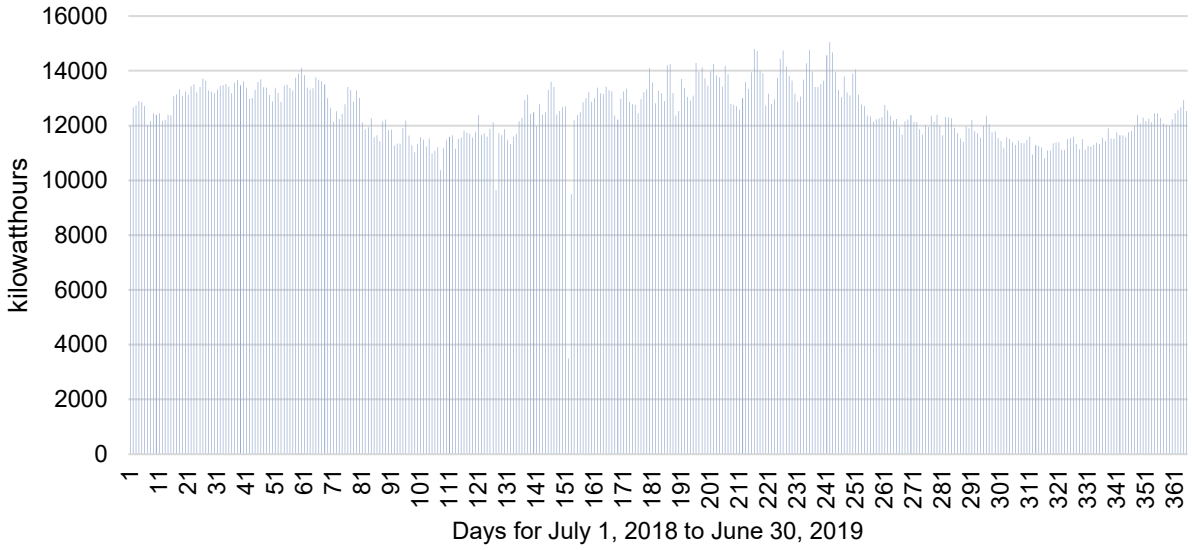
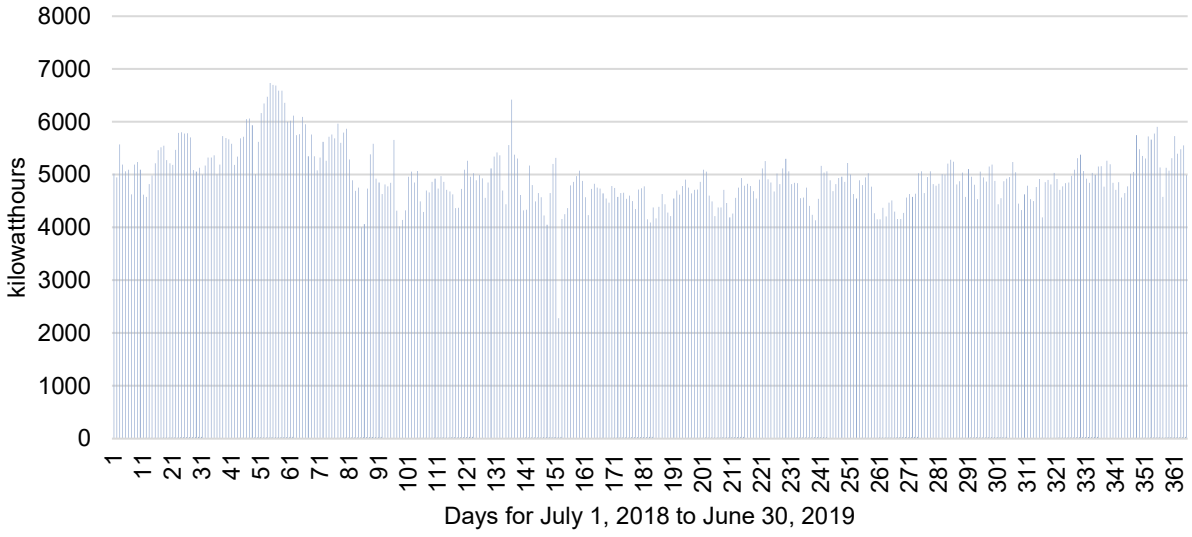
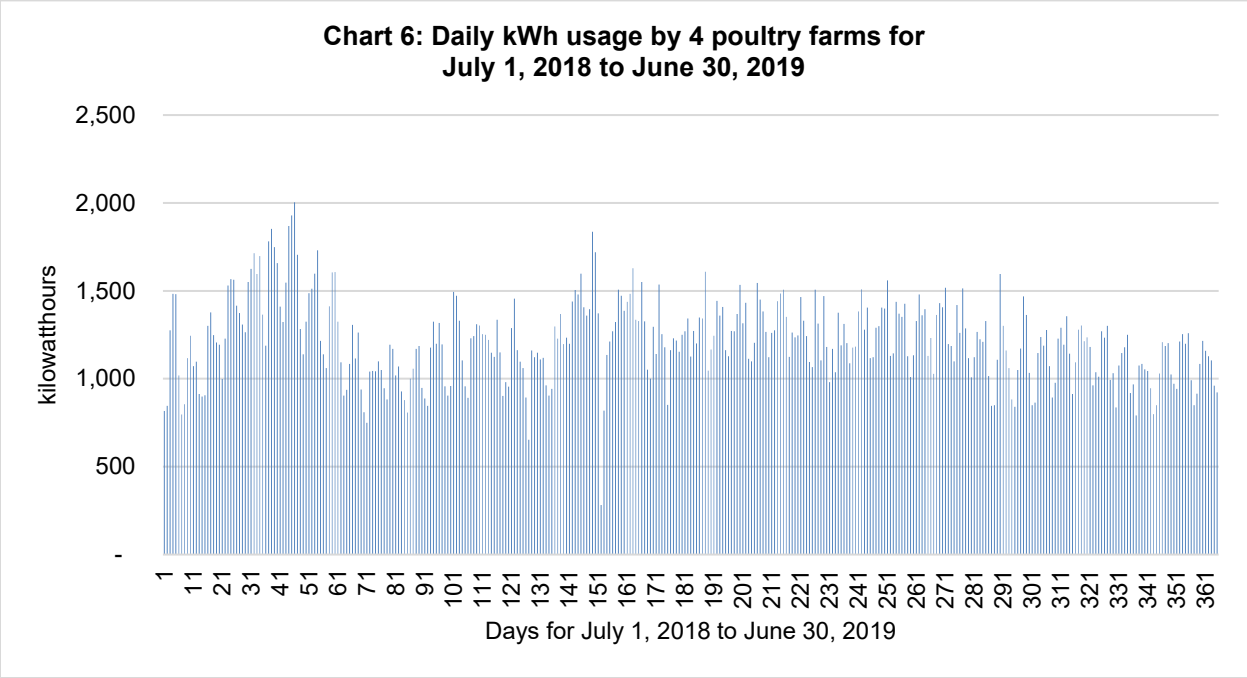


Chart 5: Daily kWh usage by 3 hog farms for July 1, 2018 to June 30, 2019





2.4 Coincident and non-coincident peak loads for farms as a group

Estimates of hourly class loads for farms were derived from the sample meters hourly data by using a load research method known as ratio estimation[4]. Ratio estimation multiplies the ratio of the sample's weighted average load for a given hour to the sample's weighted average billed energy for the month containing that hour, by the class billed energy for that same month. The resulting product is the estimated class load for the given hour in that month.

Table 8 is an example of the ratio estimation calculation. This example shows the estimate of the farm load for the hour ending 18:00 on January 17, 2020. This was the hour of the system peak load for the month of January 2020, and thus the estimated load is the farm coincident peak load for that month.

Table 8 includes the results from four additional sample meters that were installed in 2019, resulting in a total of 91 sample meters.

4 https://www.webpages.uidaho.edu/~chrisw/stat422/RatioandStRS.pdf

TABLE 8
Calculation of Farms Load for Hour Ending
18:00 on January 17, 2020 using Ratio Estimation

kWh strata boundaries		Sample meters results					Estimated load for Residential Rate farms			
Lower	Upper	Number of sample meters	Average hour load (kW)	Average billed MWh	Ratio hour load to billed	Std dev hour load (kW)	Jan 2020 Number of bills	Jan 2020 billed MWh	Total load for hour (kW)	Ave. load for hour (kW)
Potato										
0	6000	9	3.9	3.5		2.0	105	367		
6001	12000	14	11.7	9.7		5.0	117	1,009		
12001	20500	17	20.1	15.9		8.9	89	1,408		
20501	and up	12	37.2	31.0		13.0	50	1,547		
		52	15.0	12.4	0.00121		361	4,331	5,254	14.6
Dairy										
0	6500	5	10.9	4.8		6.3	62	298		
6501	11000	7	20.0	9.3		3.7	49	421		
11001	and up	18	32.7	17.0		9.3	31	501		
		30	18.8	9.0	0.00208		142	1,220	2,543	17.9
Poultry										
0	7500	3	6.6	6.1		2.7	10	51		
7501	and up	3	18.7	12.1		5.4	5	62		
		6	10.6	8.1	0.00132		15	113	148	9.9
Hog										
0	and up	3	63.3	52.1	0.00121	5.0	10	213	259	25.9
Farms total		**91**					**528**	**5,877**	**8,204**	**15.5**

Notes: 1. The random sample of 171 Residential customers and 425 General Service customers selected for the Load Study that was initiated in 2019 happened to include several potato warehouses. Where available, the hourly data from these meters has been used along with that from the 50 meters initially installed at potato farms for the Farms Study. This is the reason for 52 sample meters for potato farms in the above table.

2. Meters were installed at several additional poultry farms in late 2019 to supplement the data from the 4 poultry farms that were initially included in the Farms Study. This is the reason for 6 sample meters for poultry farms in the above table.

Table 9 shows the estimated CP and NCP loads for the months of November through February for the study period, based on ratio estimation analysis. This covers the winter period when Maritime Electric's annual system peak load occurs. It also covers the months of highest usage for potato farms, which is the main driver for farm NCP load. These CP and NCP loads are used in the calculations in Section 3 of this Farm Study to estimate RTC ratios for farm load.

TABLE 9
Estimated Coincident Peak and Non-Coincident Peak Loads for Residential Rate Farms

	2018 Nov	2018 Dec	2019 Jan	2019 Feb	2019 Nov	2019 Dec	2020 Jan	2020 Feb
MECL monthly system peak load								
Date	22	27	3	26	13	16	17	21
Hour ending	18:00	18:00	18:00	19:00	18:00	18:00	18:00	8:00
Net MWh/h	241.5	243.2	243.1	245.8	226.6	249.5	259.4	249.2
Farms CP load (MW)								
Potato farms	5.0	5.1	5.3	4.4	5.8	6.4	5.3	5.2
Dairy farms	2.4	2.6	2.5	2.9	2.2	2.4	2.5	2.7
Poultry and hog farms	0.4	0.4	0.4	0.5	0.6	0.5	0.4	0.5
	7.8	**8.1**	**8.2**	**7.8**	**8.6**	**9.3**	**8.2**	**8.4**
90 % confidence band (+/- %)	10.4	11.2	7.2	8.5	10.9	8.2	6.9	7.5
Farms NCP load (MW)								
Date	21	5	8	11	14	9	30	5
Hour ending	9:00	9:00	9:00	9:00	10:00	9:00	9:00	9:00
Potato farms	6.3	8.5	6.7	6.1	7.9	8.4	7.7	7.5
Dairy farms	2.5	2.6	2.8	2.9	1.9	2.3	2.7	2.4
Poultry and hog farms	0.4	0.6	0.5	0.5	0.6	0.6	0.5	0.5
	9.2	**11.7**	**10.0**	**9.5**	**10.4**	**11.3**	**10.9**	**10.4**
Billed energy usage (MWh)								
Potato farms	3,245	3,982	3,572	3,243	4,161	4,532	4,331	3,959
Dairy farms	1,054	1,132	1,227	1,314	1,076	1,097	1,220	1,262
Hog farms	196	185	183	186	243	208	213	218
Poultry farms	91	99	106	115	103	102	113	108
	4,586	**5,398**	**5,088**	**4,858**	**5,583**	**5,939**	**5,877**	**5,547**

3.0 Revenue-to-cost ratio for farm electricity usage

Maritime Electric operates under cost of service regulation, whereby electricity rates are intended to recover the cost of providing the service. The RTC ratio is a measure of how well the revenue collected from a given class of customers matches the estimated cost of providing electricity to that class of customers. An important result from this Farm Study is an updated estimate of RTC ratio for farm load. This updated RTC ratio has been

developed by applying the 2017 Cost Allocation Study methodology to the estimates of farm load shown in Section 2 above.

3.1 The Cost Allocation Study process

The purpose of a Cost Allocation Study is to estimate RTC ratios for each customer class, usually based on one year of data. The numerator of the ratio, revenue, is the sum of the annual bills for that customer class. Most of the effort in a Cost Allocation Study is associated with the denominator of the ratio (i.e., estimating the cost of providing electricity service for each customer class).

The Cost Allocation Study allocates costs to the various rate classes using a three-step process:

3.1.1 Functionalization – All of the Company's costs for a year are assigned to one or more of the functions involved in the supply of electricity to customers (e.g., generation, transmission, substations, distribution lines, metering, billing).

3.1.2 Classification – The costs so assigned are then classified as one or more of the following:

- Customer – These are costs related to the number of customers on the system. These costs include a portion of primary (distribution) lines, distribution transformers and secondary lines, and all of the costs associated with service lines, metering, billing and the customer service related activities.
- CP (Coincident Peak) Demand – These are costs related to the size of the annual system peak load, which include generating capacity and the transmission system through to distribution substations.
- NCP (Non-Coincident Peak) Demand – These are costs related to the size of the maximum load for a particular class of customers, which may not occur at the same time as the annual system peak load. These costs include a portion of primary (distribution) lines, distribution transformers and secondary lines.

- Energy – These are costs related to the number of kWh supplied.

3.1.3 Allocation – The classified costs are allocated to the various rate classes based on:

- For customer costs, the numbers of customers in each rate class.
- For CP demand costs, the load of each rate class at the time of annual system peak.
- For NCP demand costs, the maximum load for each rate class at any time during the year.
- For energy, the amount of kWh used by each rate class.

For Maritime Electric's 2017 Cost Allocation Study, the results of the functionalization and classification steps are summarized in Table 10. These unit costs shown can be applied to distribution system customer loads to allocate estimated costs for serving those loads in 2017.

TABLE 10
Unit Costs (from 2017 Cost Allocation Study)

Customer related	295	$/yr
CP demand related	184.46	$/kWh
NCP demand related	53.80	$/kWh
Energy related	83.00	$/MWh

3.2 Estimating 2017 revenue and cost for farm load

Table 11 shows the estimated revenue that would have been collected for the July 2018 to June 2019 farm load, shown in Table 3, using the March 1, 2017 Residential Rate charges. The calculation is patterned on the calculation of "base" revenues in the 2017 Cost Allocation Study. The results for both year round Residential and Farms are shown for comparison.

The corresponding calculation for the July 2019 to June 2020 farm load is shown in Table 12.

TABLE 11
Estimated 2017 Revenue for July 2018 to June 2019 Farm Load
(based on 2017 Cost Allocation Study)

March 1, 2017 Residential Rate charges			2017 total number of bills	
Urban monthly service chge	24.57	$/month	Urban	303,682
Rural monthly service chge	26.92	$/month	Rural	408,486
First 2,000 kWh monthly	0.1396	$/kWh		
Second block energy	0.1108	$/kWh		

	2017 Cost Allocation Study		**Jul 2018 to Jun 2019 Residential billing data**				
	Residential Year Round	**Farms**	**Potato Farms**	**Dairy Farms**	**Hog Farms**	**Poultry Farms**	**Total**
Sales data (MWh)							
First block	466,014	23,545	6,405	3,400	217	356	10,378
Second block	39,155	28,777	20,399	9,714	2,071	839	33,023
Annual sales	505,169	52,322	26,804	13,114	2,288	1,195	43,401
Average bills per month	57,286	2,094	353	143	9	15	520
Application of Rate ($000's)							
Service charges	17,781	676	114	46	3	5	168
First block energy	65,056	3,287	894	475	30	50	1,449
Second block energy	4,338	3,189	2,260	1,076	229	93	3,659
Estimated revenue as billed	87,175	7,152	3,268	1,597	263	148	5,276
Revenue as billed	86,682	7,115	3,250	1,588	261	147	5,246
Less ECAM	(1,226)	(127)	(65)	(32)	(6)	(3)	(105)
Revenue as reported	85,456	6,988	3,185	1,556	256	144	5,141
Less rate of return adjustment	(1,622)	(122)	(86)	(42)	(7)	(4)	(139)
Plus weather normalization	26	2	1	1	0	0	2
Base (allocated) revenue for 2017	83,860	6,868	3,100	1,515	248	140	5,003

TABLE 12
Estimated 2017 Revenue for July 2019 To June 2020 Farm Load
(based on 2017 Cost Allocation Study)

March 1, 2017 Residential Rate charges			2017 total number of bills	
Urban monthly service chge	24.57	$/month	Urban	303,682
Rural monthly service chge	26.92	$/month	Rural	408,486
First 2,000 kWh monthly	0.1396	$/kWh		
Second block energy	0.1108	$/kWh		

	2017 Cost Allocation Study		**Jul 2018 to Jun 2019 Residential billing data**				
	Residential Year Round	**Farms**	**Potato Farms**	**Dairy Farms**	**Hog Farms**	**Poultry Farms**	**Total**
Sales data (MWh)							
First block	466,014	23,545	6,624	3,392	235	352	10,603
Second block	39,155	28,777	24,974	9,495	2,399	847	37,715
Annual sales	505,169	52,322	31,598	12,887	2,634	1,199	48,318
Average bills per month	57,286	2,094	361	142	10	15	528
Application of Rate ($000's)							
Service charges	17,781	676	117	46	3	5	171
First block energy	65,056	3,287	925	474	33	49	1,480
Second block energy	4,338	3,189	2,767	1,052	266	94	4,179
Estimated revenue as billed	87,175	7,152	3,808	1,571	302	148	5,830
Revenue as billed	86,682	7,115	3,787	1,563	300	147	5,797
Less ECAM	(1,226)	(127)	(77)	(31)	(6)	(3)	(117)
Revenue as reported	85,456	6,988	3,710	1,531	294	144	5,679
Less rate of return adjustment	(1,622)	(122)	(101)	(41)	(8)	(4)	(155)
Plus weather normalization	26	2	2	1	0	0	2
Base (allocated) revenue for 2017	83,860	6,868	3,610	1,491	285	140	5,527

Table 13 shows the allocation of 2017 costs to the July 2018 to June 2019 farm load. The calculation is patterned on the 2017 Cost Allocation Study, and uses the load data shown in Table 9 and the 2017 unit costs shown in Table 10. The calculation of the RTC ratio is shown at the bottom of the table, using the base revenue from Table 11.

The corresponding calculation for the July 2019 to June 2020 farm load is shown in Table 14.

TABLE 13
Allocation of 2017 Costs to July 2018 to June 2019 Farm Load
(Based on 2017 Cost Allocation Study)

	Unit Costs (from 2017 Cost Allocation Study)		2017 Cost Allocation Study		Jul 2018 to Jun 2019 Residential farm load			
			Residential Year Round	Farms	Potato Farms	Dairy Farms	Poultry & Hog Farms	Total
Number customers		#	57,286	2,094	353	143	24	520
Coincident Peak Demand		(MW)	131.5	13.6	4.4	2.9	0.5	7.8
Group NCP Demand		(MW)	161.9	16.8	8.5	2.6	0.6	11.7
Energy		(MWh)	505,169	52,322	26,804	13,114	3,483	43,401
Allocated costs for 2017 ($000's)								
Customer related	295	$/yr	16,915	618	104	42	7	154
CP Demand related	184	$/kW-yr	24,257	2,509	812	535	92	1,439
NCP Demand related	54	$/kW-yr	8,710	904	457	140	32	629
Energy related	83	$/MWh	41,928	4,343	2,225	1,088	289	3,602
			91,810	8,373	3,598	1,805	421	5,824
Allocated revenues for 2017 ($000's)			83,860	6,868	3,100	1,515	388	5,003
Estimated RTC ratios (%)			91	82				86

For July 2018 to June 2019 Residential farm load:
- CP Demand is for February 26, 2019 hour ending 19:00
- NCP Demand is for December 5, 2018 hour ending 09:00

TABLE 14
Allocation of 2017 Costs to July 2019 to June 2020 Farm Load
(Based on 2017 Cost Allocation Study)

	Unit Costs (from 2017 Cost Allocation Study)		2017 Cost Allocation Study		Jul 2019 to Jun 2020 Residential Farm Load			
			Residential Year Round	Farms	Potato Farms	Dairy Farms	Poultry & Hog Farms	Total
Number customers		#	57,286	2,094	361	142	25	528
CP Demand		(MW)	131.5	13.6	5.3	2.5	0.4	8.2
Group NCP Demand		(MW)	161.9	16.8	8.4	2.3	0.6	11.3
Energy		(MWh)	505,169	52,322	31,598	12,887	3,833	48,318
Allocated costs for 2017 ($000's)								
Customer related	295	$/yr	16,915	618	107	42	7	156
CP Demand related	184	$/kW-yr	24,257	2,509	978	461	74	1,513
NCP Demand related	54	$/kW-yr	8,710	904	452	124	32	608
Energy related	83	$/MWh	41,928	4,343	2,623	1,070	318	4,010
			91,810	8,373	4,159	1,696	432	6,287
Allocated revenues for 2017 ($000's)			83,860	6,868	3,610	1,491	426	5,527
Estimated RTC ratios (%)			91	82				89

For July 2018 to June 2019 Residential farm load:
- CP Demand is for February 26, 2019 hour ending 19:00
- NCP Demand is for December 5, 2018 hour ending 09:00

Tables 13 and 14 show a RTC ratio of 0.86 for the July 2018 to June 2019 farm load, and a RTC ratio of 0.89 for the July 2019 to June 2020 farm load. These values are higher than the estimate of 0.82 for Farms in the 2017 Cost Allocation Study, but are still below the target range of 0.95 to 1.05.

4.0 The Small Industrial Rate as an alternative for large farms

Of Maritime Electric's existing rate classes, the two potential alternatives to the Residential rate for large farms are General Service and Small Industrial. Small Industrial is more appropriate because:

- The Small Industrial rate has a better matching of revenues and costs. The 2017 Cost Allocation Study estimated a 1.02 RTC ratio for Small Industrial, as compared

to 1.21 for General Service. Thus, a move to Small Industrial would involve smaller bill increases than would a move to General Service.

- The Small Industrial rate has two energy block rates, with the size of the first energy block being proportional to the size of the monthly maximum demand reading. This is better for a wide range of load factors, which is the case for individual farm loads. Under the General Service rate, the size of the first energy block is fixed at 5,000 kWh per month, regardless of the size of the monthly maximum demand reading.

Maritime Electric recommends that farm customers be given the option of being served under the Small Industrial rate or the Residential rate after the declining second block is eliminated, whichever results in a smaller increase in bills.

Chart 7 shows the estimated increase in annual electricity bills for each of 50 potato farms if charged the March 1, 2017 Small Industrial rate or the March 1, 2017 Residential rate with the second energy block removed, as a percentage increase compared to the March 1, 2017 Residential rate including the second energy block.

Chart 7: Estimated increase in annual electricity bills for each of 50 potato farms

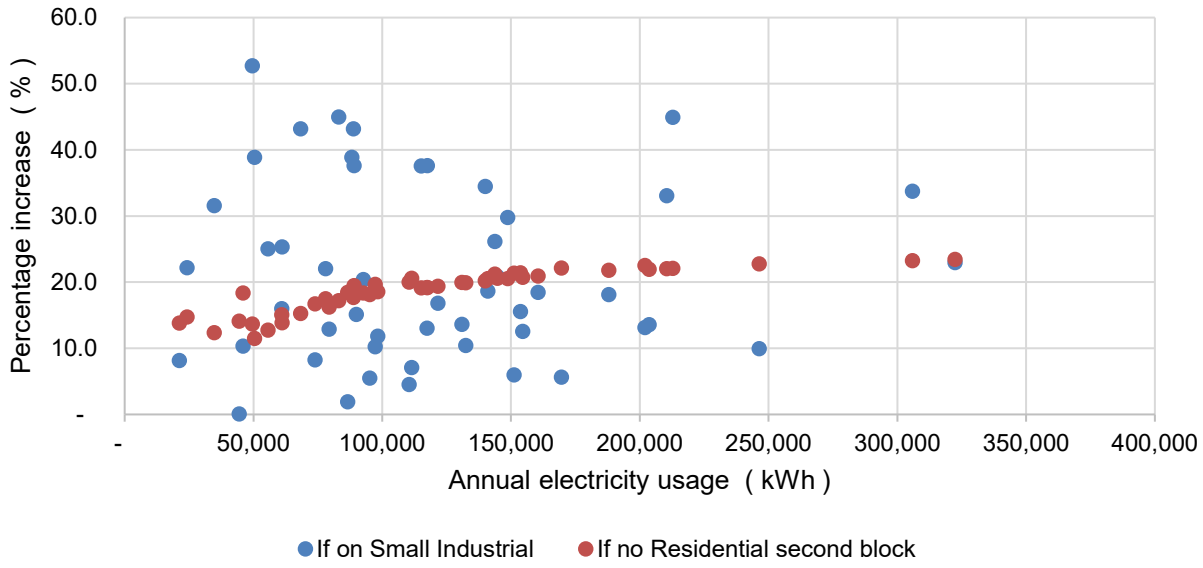
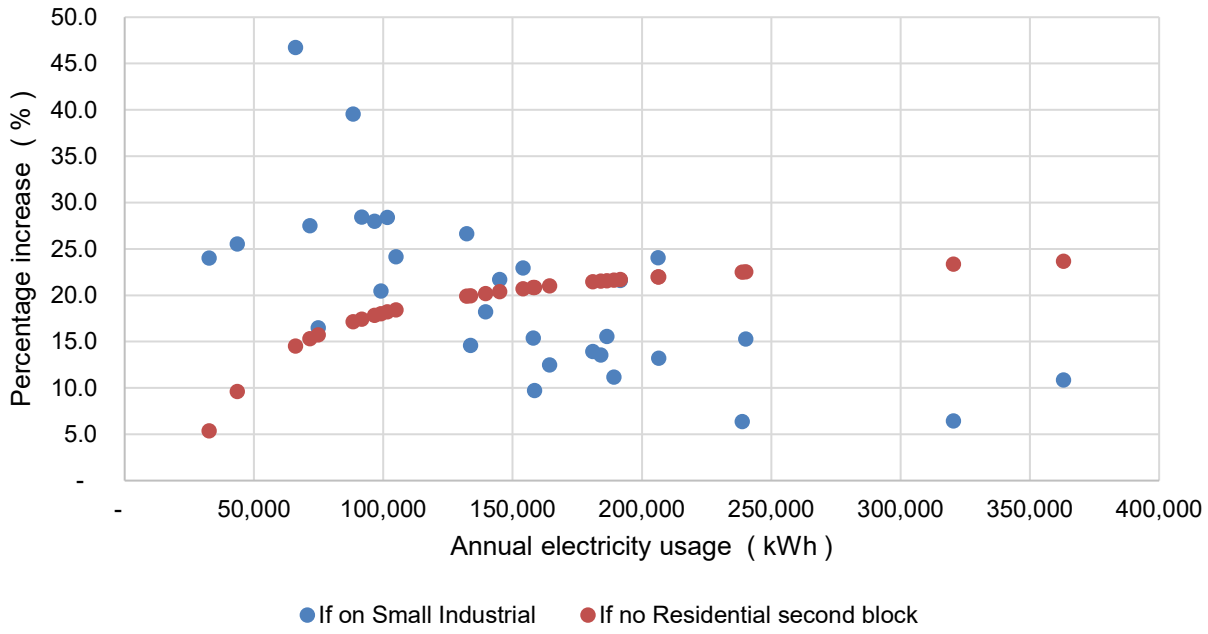


Chart 7 shows a wide range of bill increases for individual farms. The chart indicates that when the second energy block is eliminated from the Residential rate, approximately half of the 50 potato farms would experience a smaller bill increase by remaining on the Residential rate as compared to the Small Industrial rate. If farms are given a choice between being served under the Residential rate or the Small Industrial rate, the approximate increase in bills would be 20 per cent.

Chart 8 shows the estimated increases in annual electricity bills for each of the 30 dairy farms if charged the March 1, 2017 Small Industrial rate or the March 1, 2017 Residential rate with the second energy block removed, as a percentage increase compared to the March 1, 2017 Residential rate including the second energy block.

Chart 8: Estimated increase in annual electricity bills for each of 30 dairy farms



Similar to the potato farms, approximately half of the 30 dairy farms would experience a smaller bill increase by remaining on the Residential rate after the second energy block is eliminated as compared to moving to the Small Industrial rate.

5.0 Transition considerations

5.1 Consultation with the farming community

As part of the Farm Study, Maritime Electric engaged in a consultation with farmers through the PEI Federation of Agriculture and the Dairy Farmers of PEI ("DFPEI") from July 2020 to March 2021. Because of COVID-19 restrictions, a general public meeting with farmers was not possible. As an alternative, in cooperation with the executive of the two farming organizations, Maritime Electric conducted an on-line survey of the farming community to get their input on the proposed changes to rates as well as on other energy-related issues. The survey responses reflected:

- A desire to have the rate changes phased in over a number of years; and
- A lack of access to three phase power is considered an issue for a significant number of farms.

In addition to the involvement with the survey, Maritime Electric met with the Executive and/or Board of Directors of the PEI Federation of Agriculture and DFPEI on several occasions. These meetings served as opportunities for Maritime Electric to explain the electric utility regulatory process and why the proposed changes in rates are required, and to hear concerns and questions.

Maritime Electric expects to work with farms on a one-to-one basis during the transition process to help identify the best option for each individual farm.

The farm customer consultation survey results are attached to this Application as Appendix B.

5.2 Other considerations

Maritime Electric proposes that small farms should remain eligible for service under the Residential rate, provided that at least half of the electricity usage is for a year-round occupied residence. This proposal is based on the following considerations:

- More than half of the 2,200 Residential rate accounts identified as farms by SIC code in Maritime Electric's billing system have no declining second block energy usage, so they will not be affected by the elimination of the declining second block energy charge. It will help to support the tradition of the family farm in PEI. It appears that there is a growing interest in organic farming practices, in some cases on a small scale.
- It is consistent with one of the provisions of the existing Residential rate, under which a Residential rate customer may operate a business from their home, provided that the electricity usage for the business does not exceed half of the total usage.

Some of the farm accounts that would move to the Small Industrial rate currently include domestic usage, with the farm operation and house being served from one meter. Maritime Electric proposes that there would be a requirement to separate the farm operation from domestic usage, with the farm operation metered and served under the Small Industrial rate and the house metered separately and served under the Residential rate.

The average bill increase for farms that will move to the Small Industrial rate (relative to the existing Residential rate) is estimated to be 14 per cent. The impact on the Small Industrial RTC ratio of moving farm load from Residential to Small Industrial is expected to be minimal. Table 15 shows that moving 50 per cent of the farm load to Small Industrial is estimated to leave the Small Industrial RTC ratio unchanged.

TABLE 15 Impact on Small Industrial RTC Ratio of Shifting 50% of Farm Load					
			July 2019 to June 2020 Residential Farm Load		**2017 Small Industrial**
Annual sales	GWh		48.3		88.2
Existing:					
2017 Base Revenue	$000's	A	5,527	I	11,675
2017 Allocated Cost	$000's	B	6,287	J	11,403
RTC Ratio		C = A/B	0.88	K = I/J	1.02
Shift if 50 % of farm load moves to Sm Ind:					
2017 Base Revenue	$000's	D = A x 50%	(2,764)		2,764
Plus 14 % increase in bills on Sm. Ind.	$000's				387
	$000's			L	3,150
2017 Allocated Cost	$000's	E = B x 50%	(3,144)	M	3,144
New RTC ratio for Sm Ind:					
2017 Base Revenue	$000's	F	2,764	N = I + L	14,825
2017 Allocated Cost	$000's	G	3,144	O = J + M	14,547
Revenue to Cost Ratio		H = F/G	0.88	P = N/O	1.02

6.0 Statistical considerations

The purpose of this section is to consider the statistical validity of the analysis used to estimate total hourly farm load based on the hourly data from the sample meters. This is discussed under three headings:

1. Is the sample group representative of the total population?
2. Ratio estimation to calculate total farm population hourly loads.
3. Variation of farm load during the course of a year.

6.1 Is the sample group representative of the total population?

The normal approach in statistical sampling involves:

1. Selecting a random sample from the total population. This means that each individual in the total population has an equal probability of being included in the sample. If stratified random sampling is used, then each individual in a population stratum has an equal probability of being included in the sample for that stratum.

2. Determining the sample size at the start of a study, based on the desired level of accuracy for the results. Accuracy of a result is expressed as a percentage confidence level that the estimated value for the population is within a +/- per cent band around the actual value.

The sample size could not be determined in advance, in accordance with the normal approach described above, mainly because the total population was not known beforehand (i.e., a complete listing of PEI farms by farm type was not available). Rather than being a random selection in the statistical sense, the sample group of farms included in this Farm Study were identified on the basis of:

- Being among the larger farms in terms of electricity usage. It is the larger farms that will be most affected by elimination of the Residential second energy block, and thus it is the larger farms that are most relevant to the study.
- Already having a meter (i.e. installed prior to this Study) that can provide monthly demand as well as energy readings. The reasoning at the time was that this could provide monthly demand readings for 2017, the latest year for which a Cost Allocation Study would be available, which might enable greater use of the 2017 Cost Allocation Study results.[5]

An assumption was made that the farms thus selected were representative of the larger farms in PEI as a whole (i.e., in effect a reasonable proxy to a structured random sample). A check on this assumption is shown in Table 16, which shows how the sample meters are actually distributed across total farm population compared to what the distribution would be based on a random sampling.

In Maritime Electric's billing system each meter location is assigned a premise number. To take a random sample, every nth premise number could be selected in ascending order. For potato farms, the 52 sample meters with data for January 2020 represent one seventh of the total population of 361 large potato farm accounts. In Table 16, the number of potato farm accounts in each band of premise numbers has been divided by seven and rounded to approximate the result of selecting every seventh potato farm location premise

[5] Large refers to usage greater than 5,000 KWh in at least one month.

number in ascending order. A comparison of this result to the actual number of sample meters in each band of premise numbers shows that the actual distribution appears to be a reasonable approximation to the distribution that results from a random sampling process.

Table 16 also shows a similar analysis for dairy farms. Similar to potato farms, the actual distribution of sample meters appears to be a reasonable approximation to the distribution that results from a random sampling process.

TABLE 16
Comparison of Sample Meters Distribution to Total Population
(Based on Billing System Premise Number)

		Potato Farms			Dairy Farms		
		Jan 2020 population	Sample Meters Count		Jan 2020 population	Sample Meters Count	
Premise numbers		count	If 1/7	Actual	count	If 1/4.73	Actual
1 to	10000	17	2	2	9	2	2
10001 to	20000	30	4	6	14	3	1
20001 to	30000	35	5	8	20	4	4
30001 to	40000	24	3	2	9	2	2
40001 to	50000	39	6	7	19	4	3
50001 to	60000	42	6	5	20	4	3
60001 to	70000	57	8	8	27	6	5
70001 to	80000	27	4	4	10	2	4
80001 to	90000	46	7	8	2	0	1
90001 to	100000	40	6	2	11	2	5
100001 to	110000	4	1	1	1	0	0
	Totals	**361**	**52**	**53**	**142**	**29**	**30**

For the poultry and hog farms, the number of sample meters is too small to complete the same analysis as shown in Table 16. Instead, the assumption of representativeness is based on the large portion of total farm load that the sample meters account for. Using the data from Table 8, the following assessments were made:

- The 6 poultry farm sample meters account for 43 per cent of the billed energy for January 2020 (6 meters x average billed of 8.1 MWh = 48.6 MWh, which is 43 per cent of the total billed of 113 MWh for the 15 poultry farm sites).

- Similarly, the 3 hog farm sample meters account for 73 per cent of the billed energy for January 2020 (3 meters x average billed of 52.1 MWh = 156.3 MWh, which is 73 per cent of the total billed of 213 MWh for the 10 hog farm sites).

A second assumption was that the number of farms included in the sample was large enough to provide results with an acceptable level of statistical accuracy. This has proven to be true. Table 9 shows an error band of less than +/- 10 per cent at a 90 per cent confidence level for the estimates of farm coincident peak loads for most winter months. A +/- 10 per cent accuracy with 90 per cent confidence is considered to be satisfactory for load surveys of this type as it represents a reasonable compromise between a desire for a high level of accuracy versus the cost of conducting a survey.

6.2 Ratio estimation

Ratio estimation was used to derive estimates of hourly class loads for farms from the sample meters hourly data. Ratio estimation multiplies the ratio of the sample's average load for a given hour to the sample's average billed energy for the month containing that hour, by the class billed energy for that same month. The resulting product is the estimated class load for the given hour in that month.

There are two approaches for ratio estimation when using stratified random sampling:

1. Separate ratio – Used when the sample size for the various strata are 20 or more. With this approach, a ratio is calculated for each strata, and these separate ratios are multiplied by the respective class billed kWh for each strata. The resulting estimated loads for the strata are summed to give the total estimated load for the class.
2. Combined ratio – Used when the sample size for the various strata are less than 20. With this approach, one ratio is calculated from the weighted average of the loads for all strata and the weighted average of the billed kWh for all strata, and this combined ratio is multiplied by the total class billed energy for the month.

The combined ratio approach was used in this Farm Study because the strata sample sizes were less than 20, as shown in Table 8.

6.3 Variation in farm load during the course of a year

A potential problem with stratified random sampling is that over time some of the population individuals or sample individuals move between strata due to variation in monthly metered usage. This tends to increase the variance associated with the average sample meters' loads, and thus reduces the benefit from stratifying the population. However, moving sample meters between strata depending on their metered usage in a given month is not a solution because it tends to invalidate the requirement that each individual in a stratum has an equal probability of being included in the stratum sample as determined at the start of a study.

This is a concern for potato farms because of the large variation in electricity usage over the course of a year, as shown in Chart 3. Maximum electricity usage occurs in late fall and early winter, when storage volumes are highest. In late spring and early summer many warehouses are empty and use little or no electricity. This concern is largely mitigated for this Study because:

- The strata used for ratio estimation were determined based on January billing data for the farm populations.
- Farm loads for December and January are of most interest for this Study because the system annual peak load occurs in December or January.
- Farms loads are highest in December and January, driven by potato farm loads.

7.0 Conclusions

1. The estimated RTC ratio is 0.86 for the July 2018 to June 2019 farm load, and for the July 2019 to June 2020 farm load the estimated RTC ratio is 0.89. These values are higher than the 0.82 estimate for Farms in the 2017 Cost Allocation Study, but still below the target range of 0.95 to 1.05.

2. Making farms eligible for service under either the Residential or Small Industrial rates will mitigate the impact on electricity bills for some farms of the elimination of the second energy block in the Residential rate. Approximately half of the large farms for which hourly metered data was collected would experience smaller bill increases by moving to the Small Industrial rate when the Residential declining second energy block is eliminated. On the Small Industrial Rate their bill increases would be in the 10 per cent to 20 per cent range, as compared to increases of 20 per cent to 25 per cent under the Residential rate with no declining second energy block.

   The other half of the large farms would experience smaller bill increases by staying on the Residential rate. They would experience bill increases in the 10 per cent to 20 per cent range after the second energy block is eliminated. However, for both groups these are still large bill increases. A phase in over several years is recommended, with increases generally limited to 5 per cent annually.

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All the time.

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FARM CUSTOMER CONSULTATION SURVEY AND RESULTS

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Maritime Electric Consultation - PEI Farm Study on Rate Design & Impacts Survey

Introduction

In 2019, Maritime Electric was ordered by the Island Regulatory and Appeals Commission (IRAC) to address some issues with respect to customer rate classes. A couple of those issues will affect farm customers and the information collected through the attached survey is intended to provide feedback from the farming community.

The first issue is the existence of a declining block rate structure, known as the "second block", which offers a reduced rate per kWh for Residential customers who consume in excess of 2,000 kWh per month. Charging a lower price for monthly electricity usage in excess of 2,000 kWh inaccurately communicates that the cost of energy decreases with each kWh consumed. It also serves as a disincentive to energy conservation. Prince Edward Island is the last jurisdiction in the country to have a second block rate structure in the Residential Rate.

The second issue is the fact that not all rate classes are paying what it actually costs to serve that rate class. This concept is measured by a revenue-to-cost (RTC) ratio. For example, a RTC ratio above 100% indicates that the rate class is paying more than the cost to serve that rate class. Likewise, a RTC below 100% indicates that the rate class is paying less than the cost to serve. In 2019 the IRAC ordered Maritime Electric to present a Rate Design Study that ensures all rate classes have a RTC ratio between 95% and 105% by March 1, 2022.

To gain a better understanding of electricity usage by farms, in the first half of 2018 Maritime Electric installed meters capable of storing hourly electricity consumption and load data at 86 of the larger farms on PEI. In November 2019 a preliminary draft report for internal discussion was prepared based on the first 12 months of hourly load data that had been collected. The data further indicated that a rate change to better match revenues and costs for all rate classes would result in significant cost increases for large farms.

This preliminary draft report on the impact to farm customers was attached as an appendix to the Rate Design Study that was filed with IRAC in June 2020. In July 2020 Maritime Electric met with the Executive of the PEI Federation of Agriculture to discuss the Rate Design Study report and in particular the preliminary draft report on farms' electricity usage. Part of that discussion involved the benefits of collecting a comprehensive data set from PEI farms and, subsequently, the following survey was developed. In late November, Maritime Electric met with the Federation of Agriculture Board to also provide an update. Input for the survey development has come from the Federation of Agriculture and Dairy Farmers of PEI.

The survey consists of two sections. The first section collects information about your farm type and operation which will help analyze the respondents of this survey. The second section indicates the range of increases for rate design impacts and seeks your feedback and comments on the issue as well as energy conservation on your farm.

The information compiled in this survey will be presented in a report to IRAC in early 2021. Your input is important to us so that we can present your feedback to IRAC in our report.

Time:
The survey should take approximately 20 minutes to complete.

Information Collection, Sharing, and Privacy:
Maritime Electric may share the results of this survey with IRAC and the Government of Prince Edward Island in aggregate form. No personal information including names, email addresses or other individual form information will be provided. The purpose of sharing results is for regulators and Government to hear feedback from farming customers.

Note: * = required field

December 2020

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Maritime Electric Consultation – PEI Farm Study on Rate Design & Impacts Survey

1. Please provide your name or the farm name (Optional).

* 2. Farming activities (check all the apply).

- [ ] Beef Cattle Ranching and Farming, including feedlots
- [ ] Dairy Cattle and Milk Production
- [ ] Fruit and tree nut farming
- [ ] Greenhouse, nursery and floriculture production
- [ ] Hog and pig farming
- [ ] Oilseed and grain farming
- [ ] Poultry and egg production
- [ ] Sheep and goat farming
- [ ] Support activities for animal production
- [ ] Support activities for crop production
- [ ] Vegetable farming (excluding potatoes)
- [ ] Potatoes

3. Number of full time staff employed at your farm (including owners).

4. Number of part time staff employed at your farm (year-round only).

5. Number of seasonal workers employed at your farm annually (including Temporary Foreign Workers).

*6. What is the farm's annual revenue?

- ○ $10,000 to $24,999
- ○ $25,000 to $49,000
- ○ $50,000 to $99,999
- ○ $100,000 to $249,000
- ○ $250,000 to $499,999
- ○ $500,000 to $999,999
- ○ $1,000,000 to $2,000,000
- ○ $2,000,000 and over

*7. Number of acres under cultivation (where not applicable, enter '0')

Potato	
Small grains	
Corn	
Soy beans	
Other (please specify)	

Maritime Electric Consultation – PEI Farm Study on Rate Design & Impacts Survey

Energy Usage

8. Annual energy purchases for diesel fuel (litres).

9. Annual energy purchases for gas (litres).

*10. Annual energy purchases for electricity (kWh).

*11. Annual energy purchases for propane (litres).

12. Do you know your farm's proximity to three phase power?

- Yes
- No
- Not applicable
- Already have it

13. Would you change over if it became available?

- Yes
- No
- Not applicable

Crop Details

14. Do you grow potatoes on your farm? If yes, please complete the following fields. Where not applicable, please insert "0".

Average annual number of acres	
Estimated average total annual production (Cwt)	
Number of warehouses (if applicable)	
Total storage capacity (Cwt)	

15. Do you grow small grains on your farm? If so, please complete the following fields. Where not applicable, please insert "0".

Average annual number of acres	
Estimated average total annual production (Metric tonnes)	
Number of tanks (if applicable)	
Total storage capacity (Metric tonnes)	

16. Do you grow corn on your farm? If so, please complete the following fields. Where not applicable, please insert "0".

Average annual number of acres	
Estimated average total annual production (Metric tonnes)	
Number of tanks (if applicable)	
Total storage capacity (Metric tonnes)	

17. Do you grow soy beans on your farm? If so, please complete the following fields. Where not applicable, please insert "0".

Average annual number of acres	
Estimated average total annual production (Metric tonnes)	
Number of tanks (if applicable)	
Total storage capacity (Metric tonnes)	

18. Do you grow another crop not listed above on your farm? If so, please specify and complete the following fields. Where not applicable, please insert "0".

Please specify crop...	
Average annual number of acres	
Estimated average total annual production (Metric tonnes)	
Number of tanks (if applicable)	
Total storage capacity (Metric tonnes)	

Maritime Electric Consultation – PEI Farm Study on Rate Design & Impacts Survey

Livestock Details

19. Do you have dairy cows on your farm? If yes, please complete the following fields.

Total number of animals in your herd	
Number of cows milking	
Annual milk production (litres)	

20. Do you have robotic milkers?

- ◯ Yes
- ◯ No

21. Do you have beef animals on your farm?

- ◯ Yes
- ◯ No

If yes, specify the number of beef animals in the herd.

22. Do you have hogs on your farm?

- ◯ Yes
- ◯ No

If yes, specify the annual number of animals finished.

23. Do you have poultry on your farm?

- ◯ Yes
- ◯ No

24. If yes, please complete the following fields.

Number of birds	
Average annual quantity of meat birds (live kg)	
Average annual quantity of meat birds (processed kg)	
Average annual number of eggs sold (dozens)	

25. Do you have other animals on your farm?

- ◯ Yes
- ◯ No

If yes, specify the annual number of animals finished.

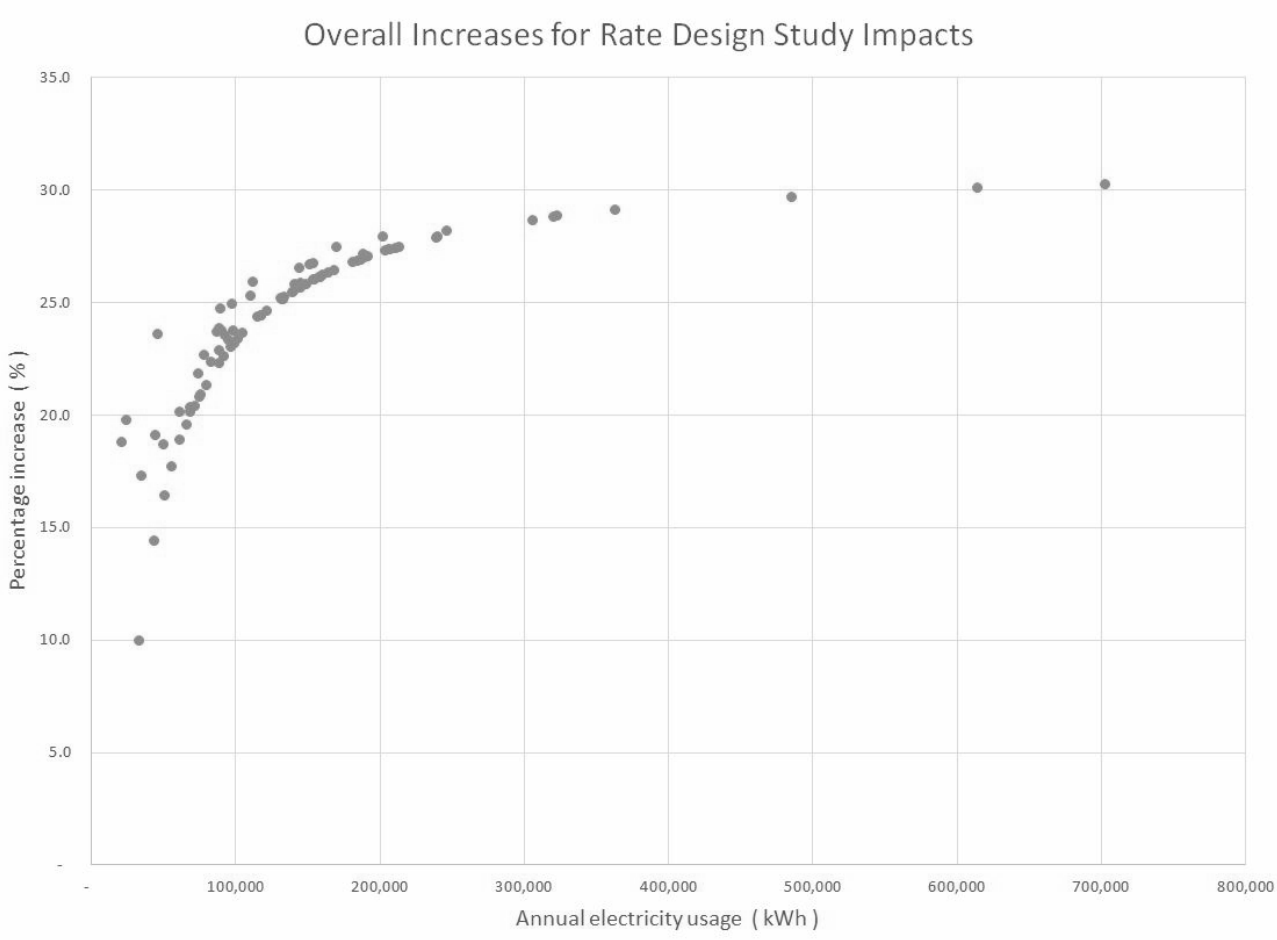
Estimated Electricity Rate Chart & Feedback Section

The following chart shows the estimated increases in annual costs for 86 of the larger farms in PEI due to elimination of the second energy block under the Residential Rate (with no phased-in approach) and bringing the revenue-to-cost (RTC) ratio within the required range.

For some farms the increase could be mitigated by making farms eligible for service under the Small Industrial Rate. Of the 86 large farms on the Residential Rate, for which hourly data is being collected, approximately half would be better off moving to the Small Industrial Rate when the Residential second energy block is eliminated. On the Small Industrial Rate customers' bill increases would be approximately in the 10% to 20% range, as compared to increases of 20% to 25% under the Residential Rate with no second energy block.

The other half of the 86 large farms would be better off staying on the Residential Rate. Customers would experience bill increases approximately in the 10% to 20% range after the second energy block is eliminated.

However, Maritime Electric recognizes that for both groups these are still large increases and based on feedback from this survey, the Company may propose a phase-in period to IRAC.



*26. For larger electricity users, the impact on your farm from the elimination of the second energy block in Maritime Electric's Residential Rate ranges based on electricity use (as you can see from the chart above). If the change is phased in over a number of years, what do you suggest as the **maximum** annual percentage increase in bills due to this change?

*27. Based on your previous answer, what do you believe is an acceptable **timeframe** for increasing the cost of electricity bills?

- 1-3 years
- 3-5 years
- 5 years
- Longer than 5 years

*28. On a scale of 1 to 10, how confident are you in your energy conservation ideas and solutions (such as energy audits, energy retrofits, etc.) for your farm operations?

0 5 10

*29. Do you feel your farm needs more information on energy conservation technology and programs?

- Yes
- No
- I don't know

30. Please provide further comments on energy conservation at your farm.

31. Do you produce renewable energy on your farm (i.e. wind, solar, methane, etc.)?

- Yes
- No
- I don't know

32. What type of renewable energy do you currently produce on your farm?

- Wind
- Solar
- Methane
- I do not currently produce renewable energy on my farm
- Other (please specify)

33. If no, are you interested in renewable energy for your farm?

- ◯ Yes
- ◯ No
- ◯ Need more information

34. Which type of renewable energy are you interested in for your farm? Check all that apply.

- ◯ Wind
- ◯ Solar
- ◯ Methane
- ◯ I do not currently produce renewable energy on my farm
- ◯ Other (please specify)

35. Please provide any further comments you have.

Thank you for your feedback.

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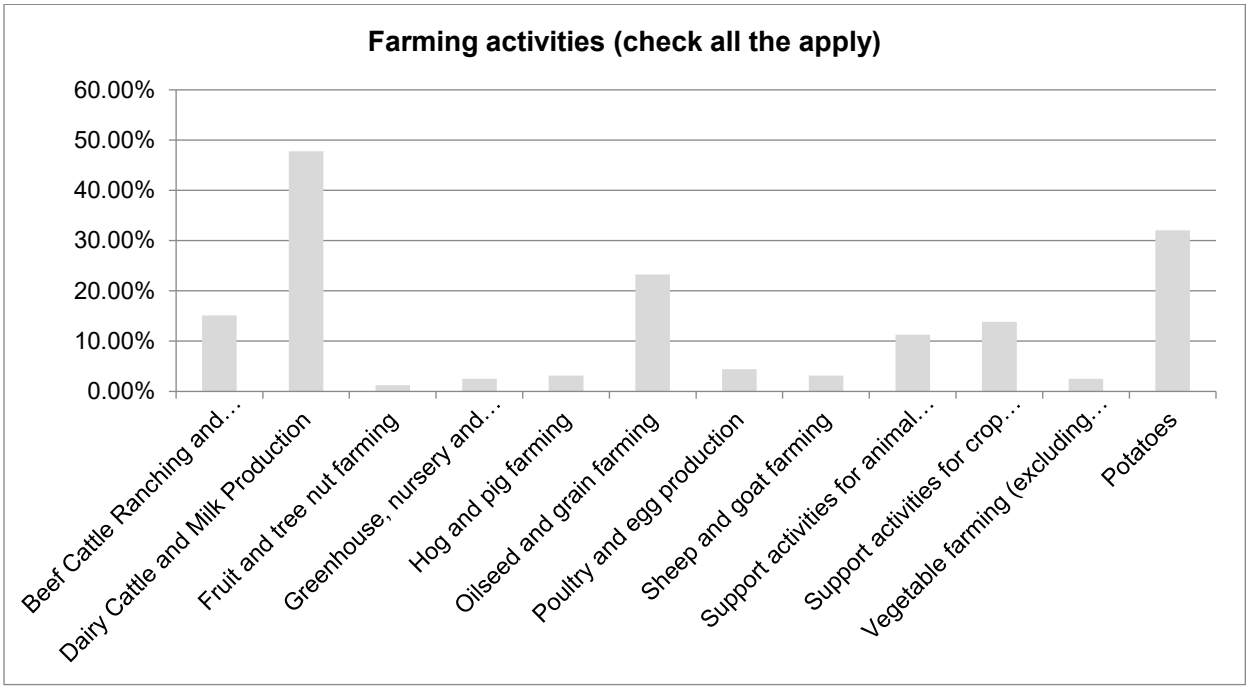
Question 1
Please provide your name or the farm name (Optional).

Answered	93
Skipped	66

Data redacted for participant privacy.

Question 2 – Farming activities (check all that apply).

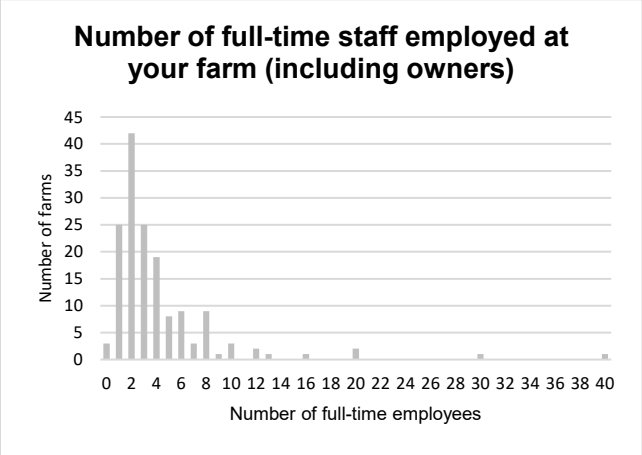
Answer Choices	Responses	
Beef Cattle Ranching and Farming, including feedlots	15.09%	24
Dairy Cattle and Milk Production	47.80%	76
Fruit and tree nut farming	1.26%	2
Greenhouse, nursery and floriculture production	2.52%	4
Hog and pig farming	3.14%	5
Oilseed and grain farming	23.27%	37
Poultry and egg production	4.40%	7
Sheep and goat farming	3.14%	5
Support activities for animal production	11.32%	18
Support activities for crop production	13.84%	22
Vegetable farming (excluding potatoes)	2.52%	4
Potatoes	32.08%	51
	Answered	**159**
	Skipped	**0**

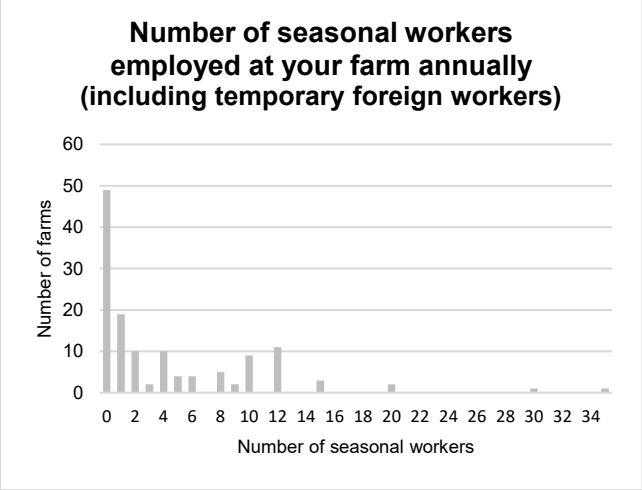


Question 3, 4, 5
Number of staff employed at your farm

	Responses		
	Full-time Staff	**Part-time Staff**	**Seasonal Staff**
Answered	155	127	132
Skipped	4	32	27

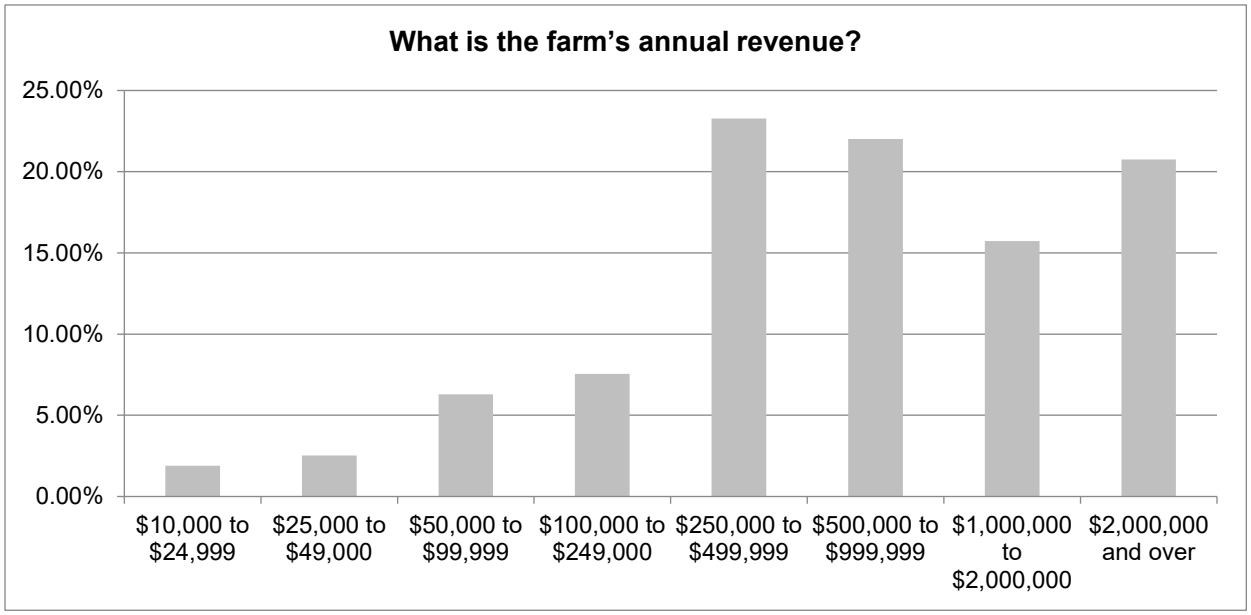
Number of Staff	**Number of Farms**		
	Full-time	**Part-time**	**Seasonal**
0-4	114	106	90
5-9	30	13	15
10-14	6	6	20
15-19	1	1	3
20-24	2	1	2
25-29	0	0	0
30-34	1	0	1
35-39	0	0	1
40-44	1	0	0





Question 6
What is the farm's annual revenue?

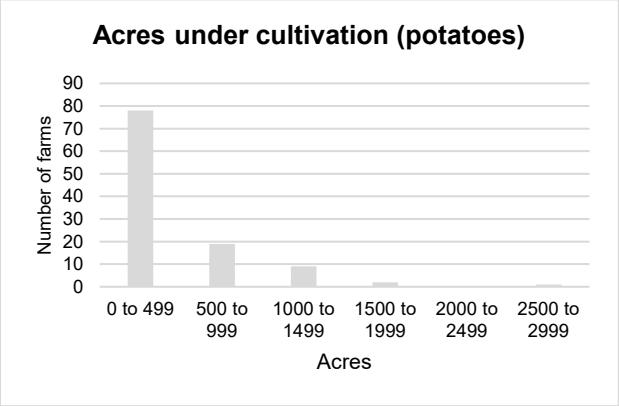
Answer Choices	Responses	
$10,000 to $24,999	1.89%	3
$25,000 to $49,000	2.52%	4
$50,000 to $99,999	6.29%	10
$100,000 to $249,000	7.55%	12
$250,000 to $499,999	23.27%	37
$500,000 to $999,999	22.01%	35
$1,000,000 to $2,000,000	15.72%	25
$2,000,000 and over	20.75%	33
	Answered	**159**
	Skipped	**0**

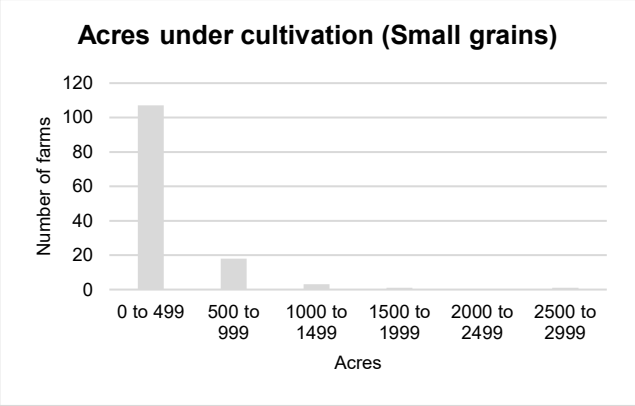


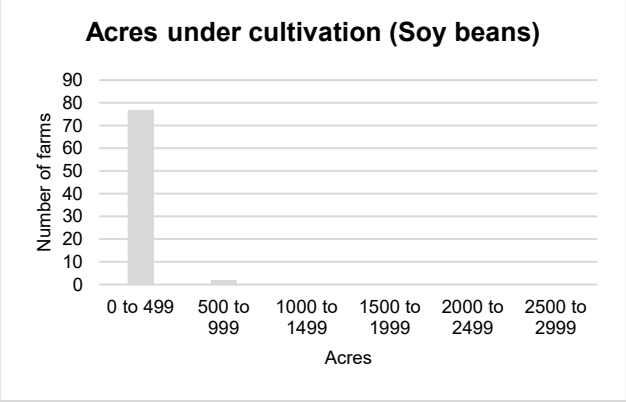
Question 7
Number of acres under cultivation (where not applicable, enter '0')

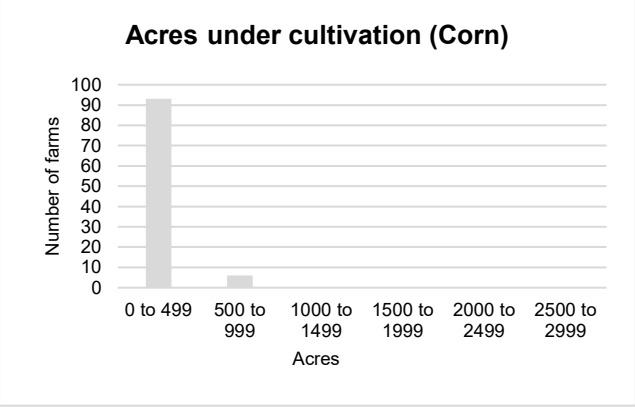
Answer Choices	Responses	
Potato	68.55%	109
Small grains	81.76%	130
Corn	62.26%	99
Soy beans	49.69%	79
Other (please specify)	72.96%	116
	Answered	**159**
	Skipped	**0**

Acres under Cultivation	Number of farms			
	Potatoes	Small Grains	Corn	Soy Beans
0 to 499	78	107	93	77
500 to 999	19	18	6	2
1000 to 1499	9	3	0	0
1500 to 1999	2	1	0	0
2000 to 2499	0	0	0	0
2500 to 3000	1	1	0	0









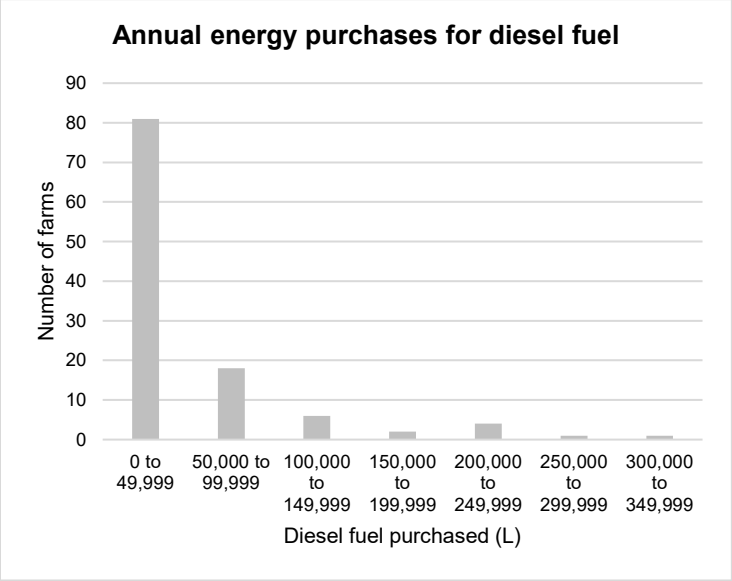
Other (please specify)

Grass 300	100 forage	Forages 670
200 - pasture	Hay 150	160 grass/legume pasture
Forages for dairy 200	300 Pasture and forage	500 (Hay and Rotational Cropping)
Silage	Forages 260	
Cover crops 1000	Grass 700	250 grass
490 hay and silage	Hay 150, 50 acres of potatoes grown by another farm	0
Silage/hay 300	Grasses 200	600 forages
360 hay	Grass/Hay/Silage (200 acres)	1000 acres green plowdown
Cover Crop 400	Hay 450	120 grass
50 carrots	Pumpkins 6/Sweet Corn 6	650 grass
860 hay mixes and sudan, radish etc.	700	Green Manure plowdown 400 ac
0	150 - grass silage	35 grass
50 grass	Hay/ Haylage	200 hay
Hay - 200 acres	100 alfalfa	250 Hay/silage
20 acres of apple farm	Grass 450	Cranbie 80
1000 forage	Hay/silage 120	Grass 120
300 grass	Alfalfa/hay 170	Hay and silage
0	300	0
Hay 200	Pasture 200	130 hay
Hay 230	Hay 230	700 hay silage
2800	alfalfa 100	0
480 forages/grass	Forage 350	Hay 200
Peas 150 Hay 500	0	None
Forage 140	forage 300	200 pasture and hay/silage
Processor, not a grower	direct seeded oats/peas - 200	Forage 150
200	Sudan/sorghum and forage 450	Hay 100
Hay	0	200 grasssilage
50 oats and peas	600	Grass, hay 100 acres
Forages	hay 200	4 acres greenhouse veg
425	Peas 280 Buckwheat 225	350 hay
Soil builder	450 sudan/sorghum	Alfalfa 400
149 hay	1700 soil building crops	0
1000	400 Grass and Legume Forages	N/A
15 Pasture	150 forage	100 forage
0	1000 silage and hay	Hayland-250 acres
180 vegetables	560 hay	670 forages
0	Grasses/cover crops 2000	0
5 (Pumpkin/cucumber) 80 rental (vegetable/forage/corn)	0	
Hayland 250 acres	12 acres strawberries and mixed vegetables	

Question 8, 9, 10, 11
Annual energy purchases

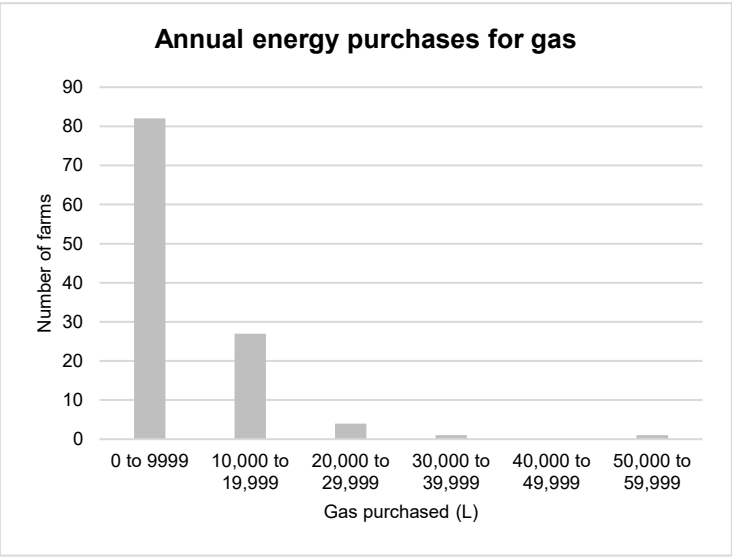
Answer Choices	Responses	
Potato	68.55%	109
Small grains	81.76%	130

	Responses			
	Diesel fuel	Gas	Electricity	Propane
Answered	117	117	117	117
Skipped	42	42	42	42



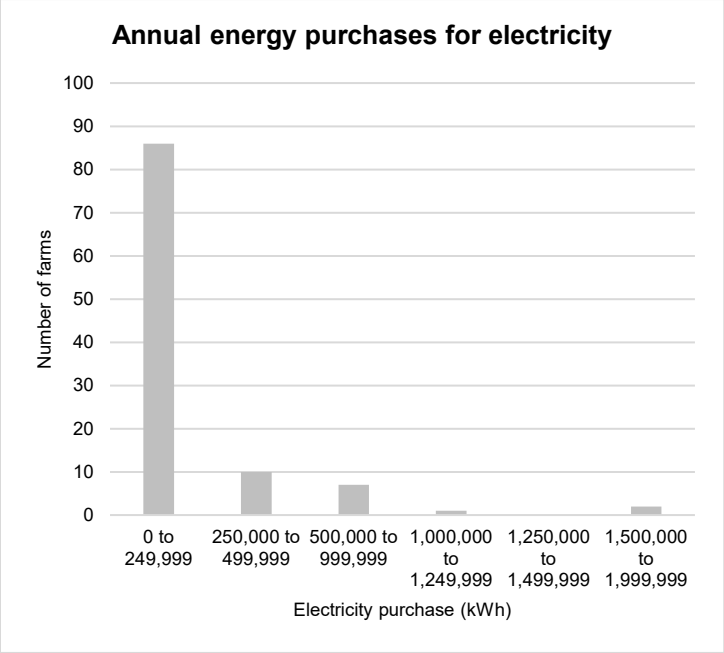
Diesel fuel purchased (L)	Number of Farms
0 to 49,999	81
50,000 to 99,999	18
100,000 to 149,999	6
150,000 to 199,999	2
200,000 to 249,999	4
250,000 to 299,999	1
300,000 to 349,999	1

Other responses:
- $3,500
- Unknown
- 10,000 to 15,000
- Approximately 5,000 to 6,000

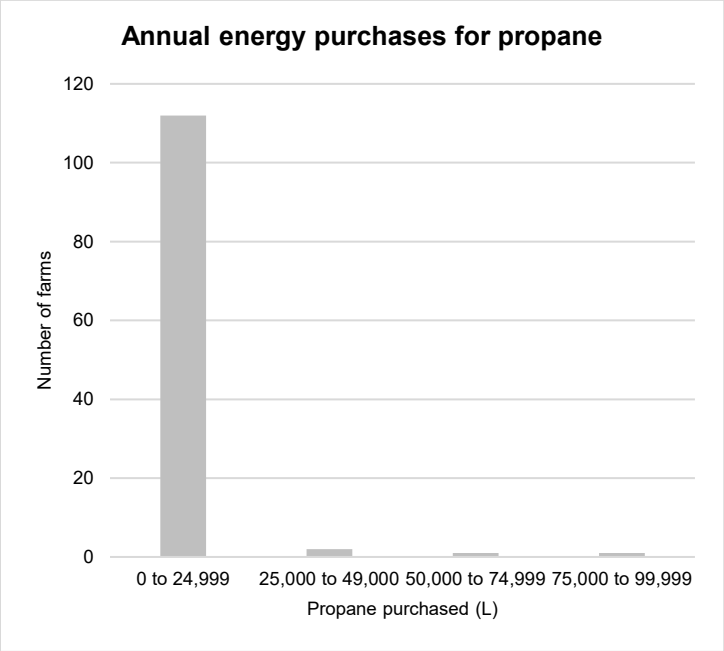


Gas purchased (L)	Number of Farms
0 to 9999	82
10,000 to 19,999	27
20,000 to 29,999	4
30,000 to 39,999	1
40,000 to 49,999	0
50,000 to 59,999	1

Other responses:
- Unknown
- not sure



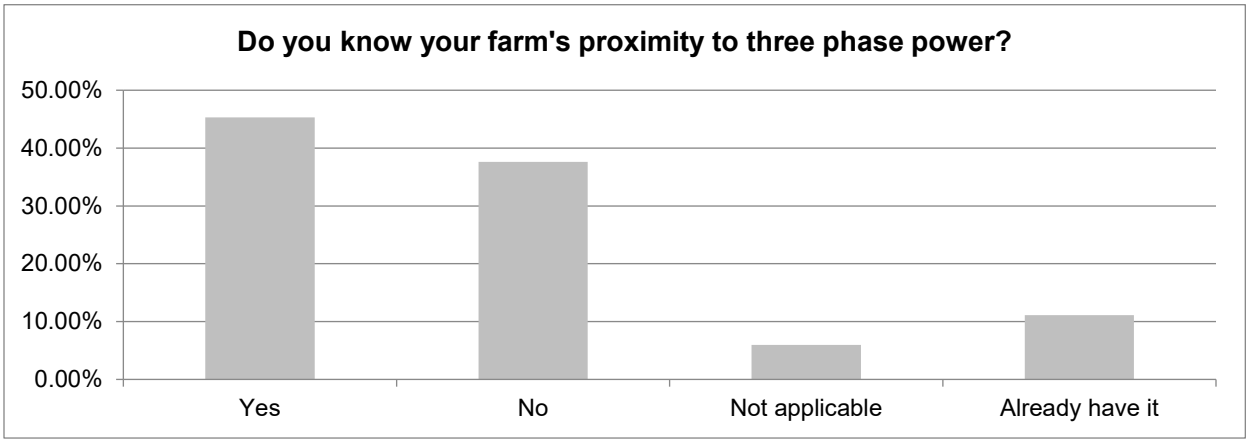
Electricity purchased (kWh)	Number of Farms
0 to 249,999	86
250,000 to 499,999	10
500,000 to 999,999	7
1,000,000 to 1,249,999	1
1,250,000 to 1,499,999	0
1,500,000 to 1,999,999	2
Other responses: ▪ $7,000 ▪ $9,000 ▪ $13,000 ▪ ? ▪ ? $30,000 ▪ ~ $800/month ▪ 25000 to 30000 ▪ alot ▪ not sure ▪ please look up on my bill ▪ unknown	



Propane purchased (L)	Number of Farms
0 to 24,999	112
25,000 to 49,000	2
50,000 to 74,999	1
75,000 to 99,999	1
Other responses: ▪ Minimal	

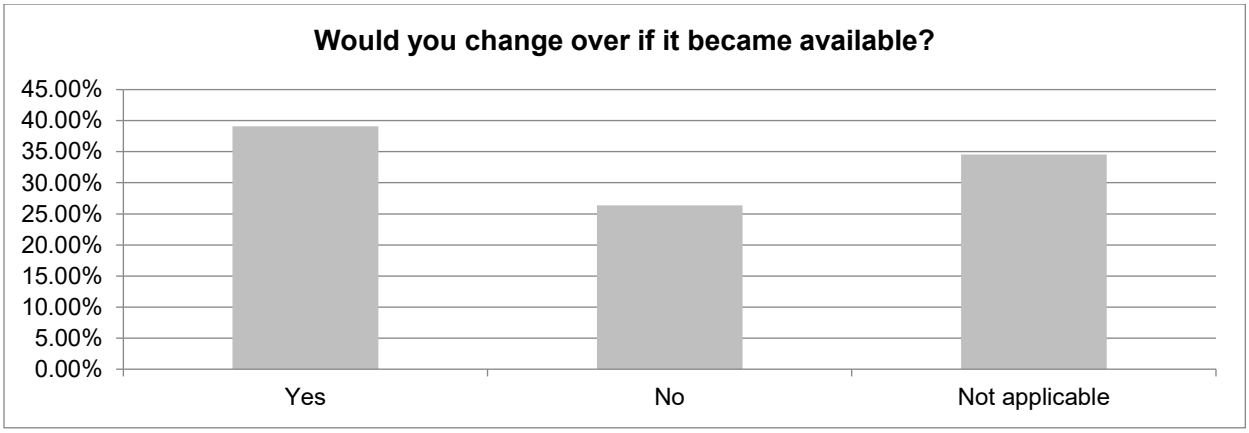
Question 12
Do you know your farm's proximity to three phase power?

Answer Choices	Responses	
Yes	45.30%	53
No	37.61%	44
Not applicable	5.98%	7
Already have it	11.11%	13
	Answered	**117**
	Skipped	**42**



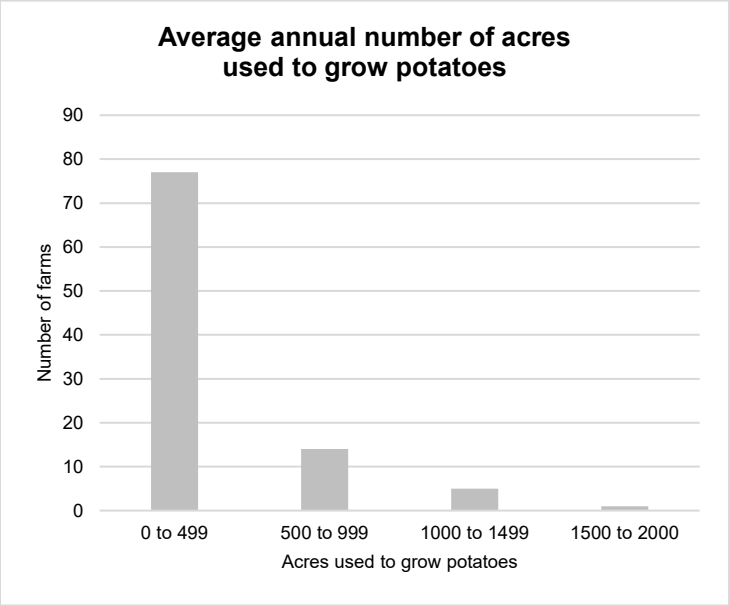
Question 13
Would you change over if it became available?

Answer Choices	Responses	
Yes	39.09%	43
No	26.36%	29
Not applicable	34.55%	38
	Answered	**110**
	Skipped	**49**

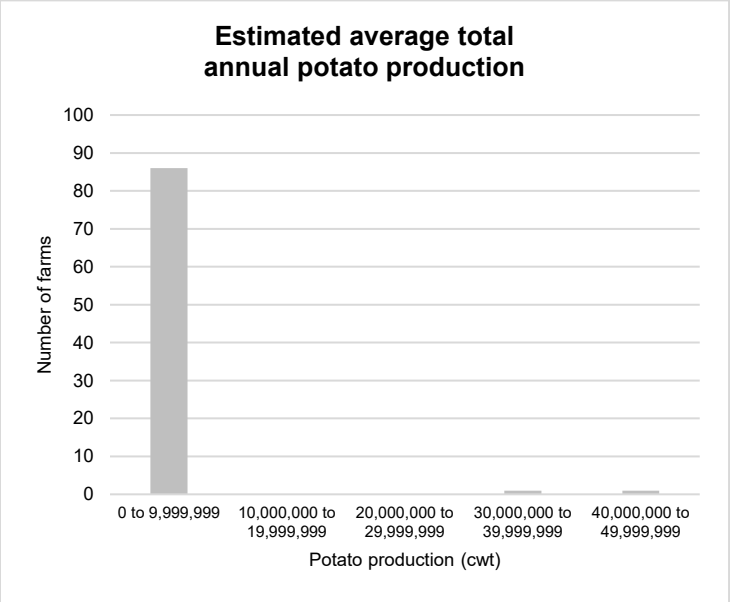


Question 14
Do you grow potatoes on your farm? If yes, please complete the following fields. Where not applicable, please insert "0".

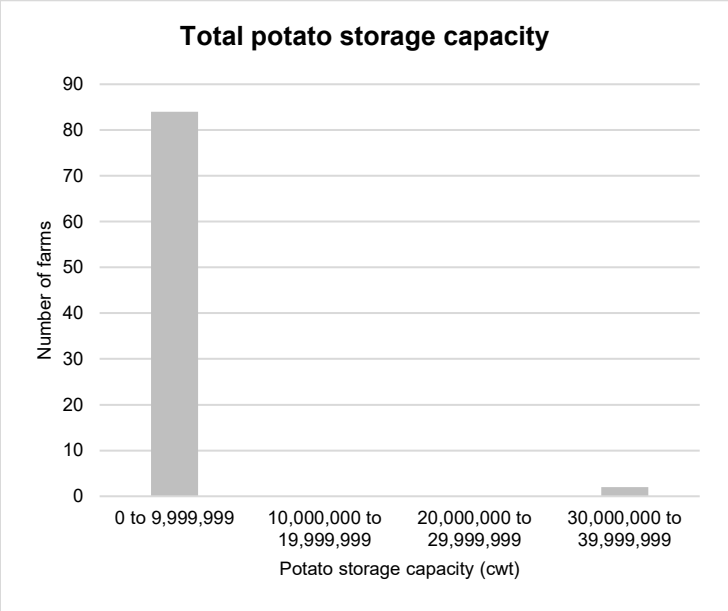
Answer Choices	Responses	
Average annual number of acres	100.00%	99
Estimated average total annual production (Cwt)	90.91%	90
Number of warehouses (if applicable)	90.91%	90
Total storage capacity (Cwt)	87.88%	87
	Answered	**99**
	Skipped	**60**



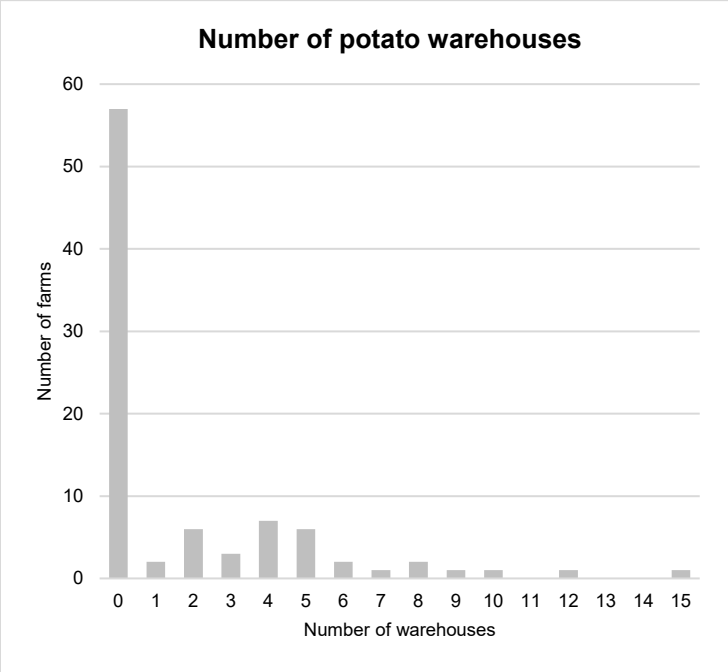
Acres used to grow potatoes	Number of Farms
0 to 499	77
500 to 999	14
1000 to 1499	5
1500 to 2000	1
Other responses: ▪ 100 acres rented to another farmer	



Potato production (cwt)	Number of Farms
0 to 9,999,999	86
10,000,000 to 19,999,999	0
20,000,000 to 29,999,999	0
30,000,000 to 39,999,999	1
40,000,000 to 49,999,999	1
Other responses: ▪ 300 cwt/ acre ▪ ?	



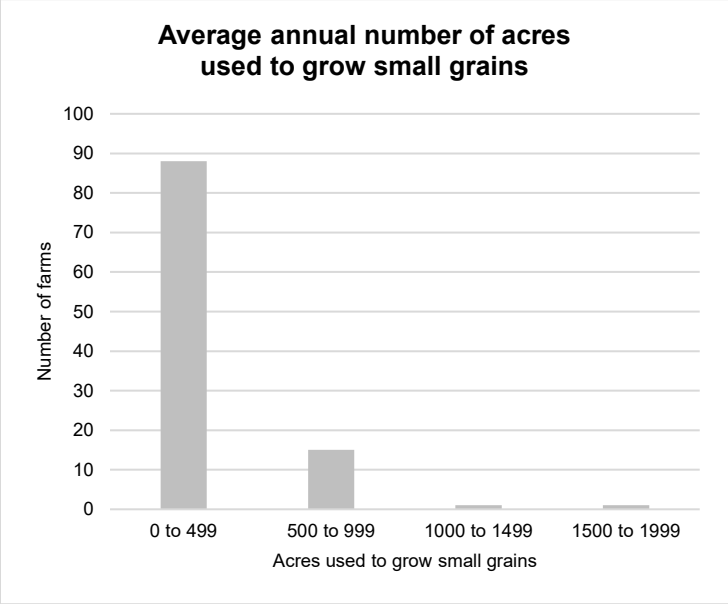
Number of warehouses	Number of farms
0	57
1	2
2	6
3	3
4	7
5	6
6	2
7	1
8	2
9	1
10	1
11	0
12	1
13	0
14	0
15	1



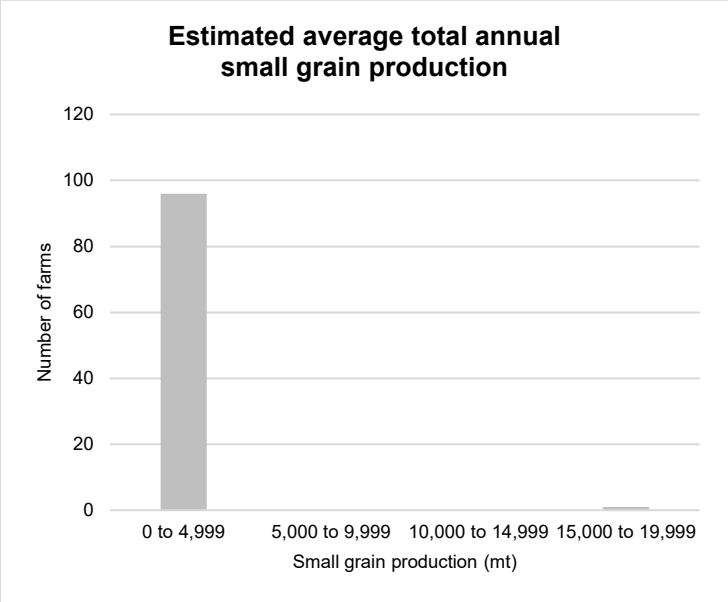
Potato storage capacity (cwt)	Number of Farms
0 to 9,999,999	84
10,000,000 to 19,999,999	0
20,000,000 to 29,999,999	0
30,000,000 to 39,999,999	2
Other responses: ▪ Don't know	

Question 15
Do you grow small grains on your farm? If so, please complete the following fields. Where not applicable, please insert "0".

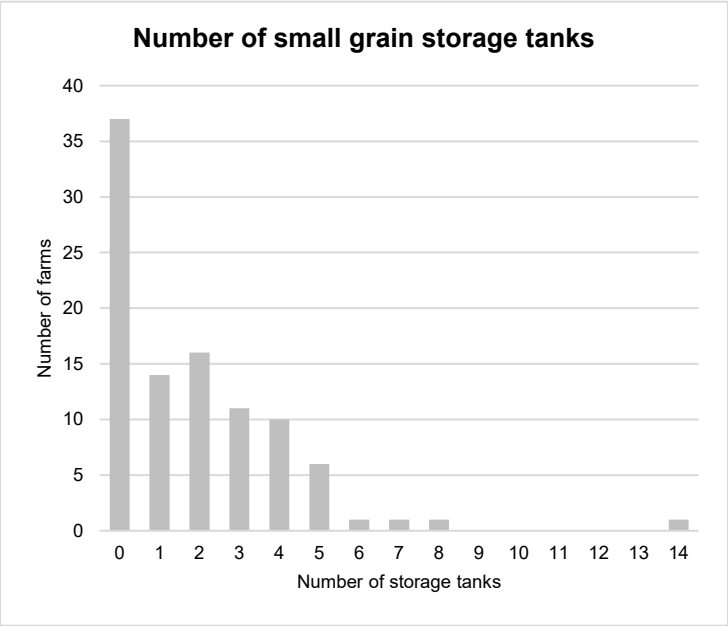
Answer Choices	Responses	
Average annual number of acres	100.00%	106
Estimated average total annual production (metric tonnes)	92.45%	98
Number of tanks (if applicable)	92.45%	98
Total storage capacity (metric tonnes)	93.40%	99
	Answered	**106**
	Skipped	**53**



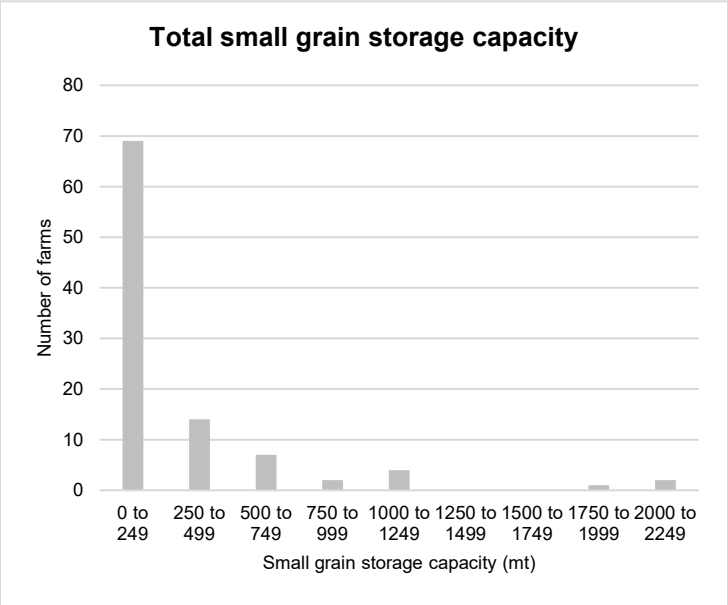
Acres used to grow small grains	Number of Farms
0 to 499	88
500 to 999	15
1000 to 1499	1
1500 to 1999	1
Other responses: ▪ 55-60	



Small grain production (mt)	Number of Farms
0 to 4,999	96
5,000 to 9,999	0
10,000 to 14,999	0
15,000 to 19,999	1
Other responses: ▪ 82 to 90 mt	



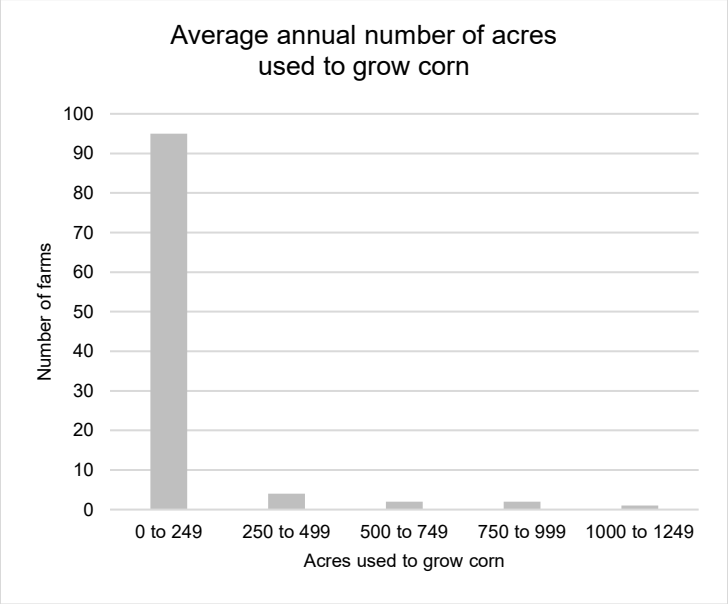
Number of storage tanks	Number of farms
0	37
1	14
2	16
3	11
4	10
5	6
6	1
7	1
8	1
9	0
10	0
11	0
12	0
13	0
14	1



Small grain storage capacity (mt)	Number of Farms
0 to 249	69
250 to 499	14
500 to 749	7
750 to 999	2
1000 to 1249	4
1250 to 1499	0
1500 to 1749	0
1750 to 1999	1
2000 to 2249	2

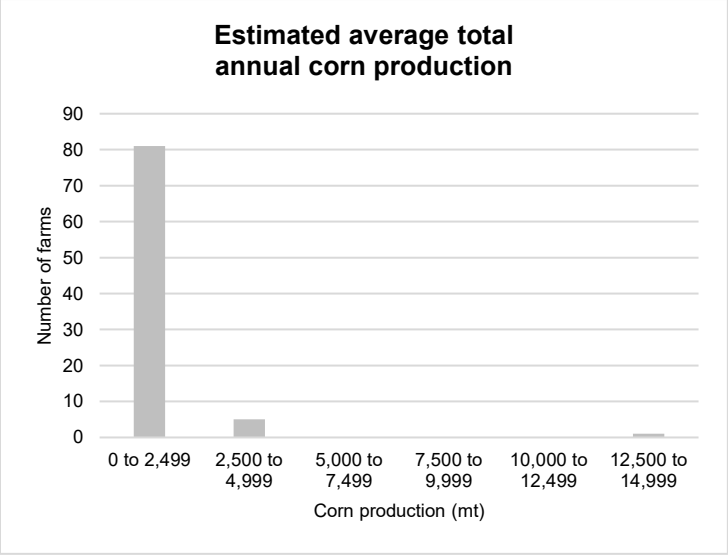
Question 16
Do you grow corn on your farm? If so, please complete the following fields. Where not applicable, please insert "0".

Answer Choices	Responses	
Average annual number of acres	100.00%	108
Estimated average total annual production (metric tonnes)	89.81%	97
Number of tanks (if applicable)	83.33%	90
Total storage capacity (metric tonnes)	87.04%	94
	Answered	**108**
	Skipped	**51**



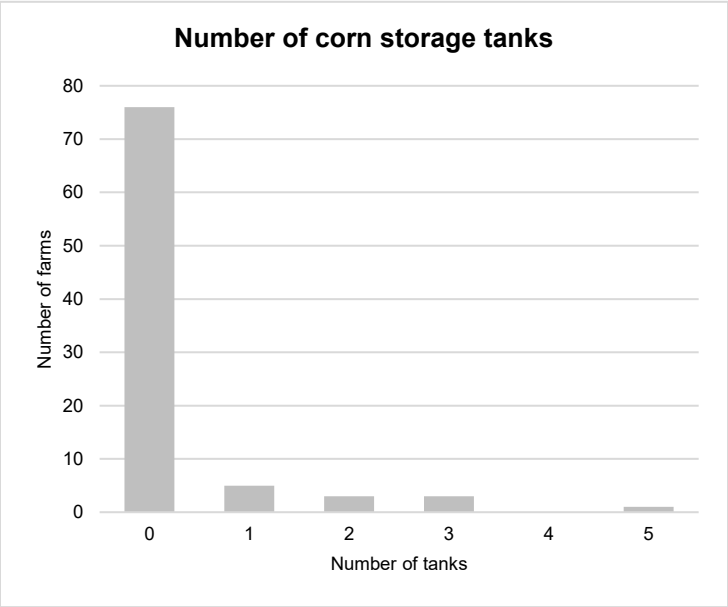
Acres used to grow corn	Number of Farms
0 to 249	95
250 to 499	4
500 to 749	2
750 to 999	2
1000 to 1249	1

Other responses:
- 40 Rotational (rental)
- 65 acres of corn silage
- 30 (silage corn)
- 80 silage



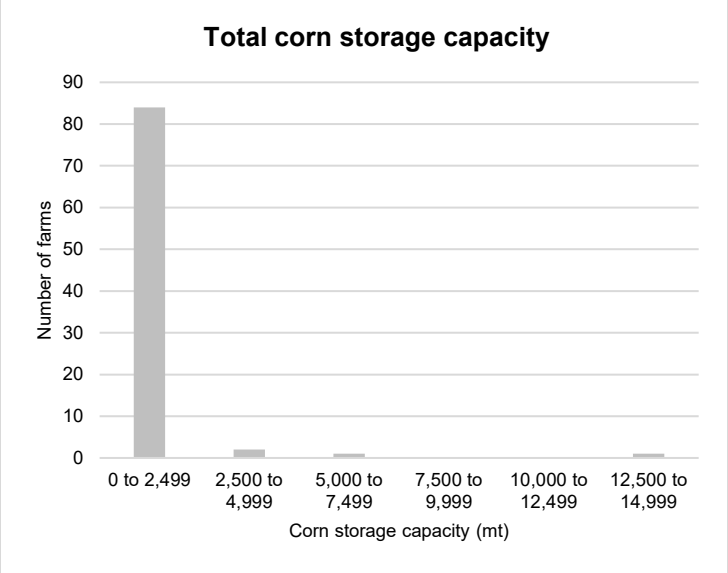
Corn production (mt)	Number of Farms
0 to 2,499	81
2,500 to 4,999	5
5,000 to 7,499	0
7,500 to 9,999	0
10,000 to 12,499	0
12,500 to 14,999	1

Other responses:
- ?
- 800 wet mt
- 16 ton corn silage/acre
- Corn Silage not grains
- silage- 6000 mt/grain corn- 400 mt
- 585 t of silage
- Unsure used as corn sileage
- 600 corn silage
- 9 M/T per acre
- 1500 tonnes of silage



Number of storage tanks	Number of farms
0	76
1	5
2	3
3	3
4	0
5	1

Other responses:
- corn silage and cob meal is grown
- ?

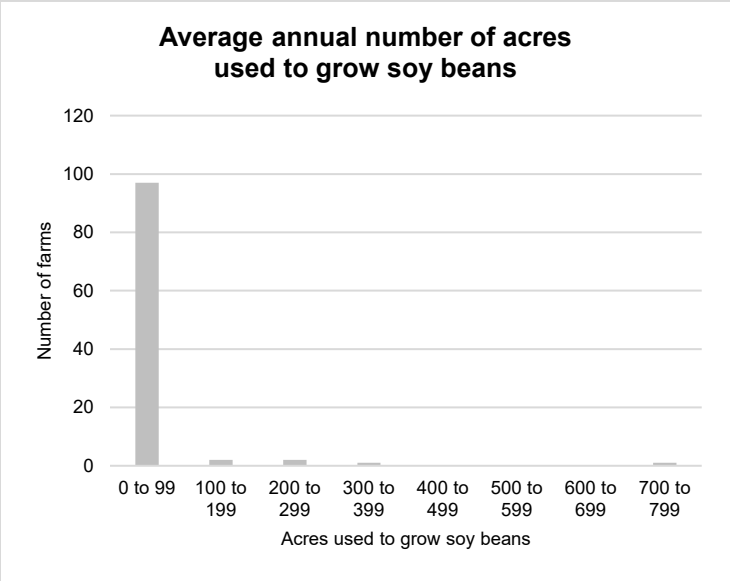


Corn storage capacity (mt)	Number of Farms
0 to 2,499	84
2,500 to 4,999	2
5,000 to 7,499	1
7,500 to 9,999	0
10,000 to 12,499	0
12,500 to 14,999	1

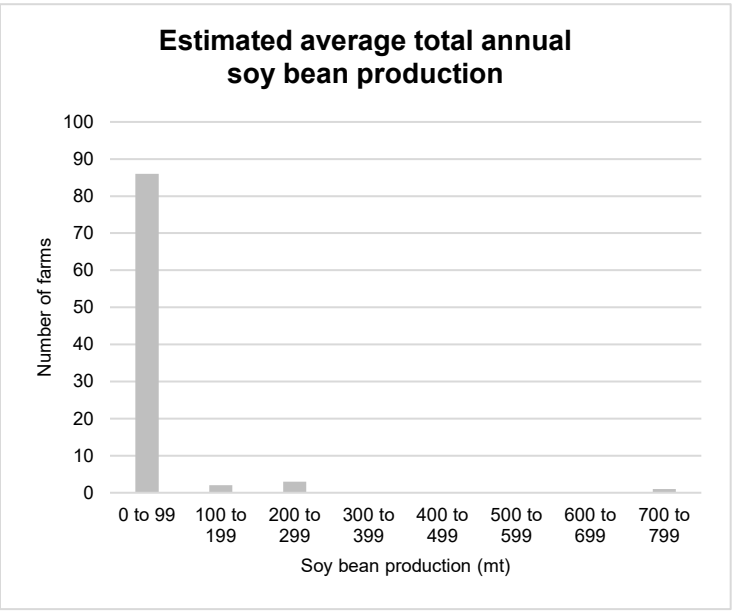
Other responses:
- ?
- As required
- Wrapped in plastic, all stored on farm
- Silage 1000
- Stored in bunks, no power needed
- Stored in bunkers

Question 17
Do you grow soy beans on your farm? If so, please complete the following fields. Where not applicable, please insert "0".

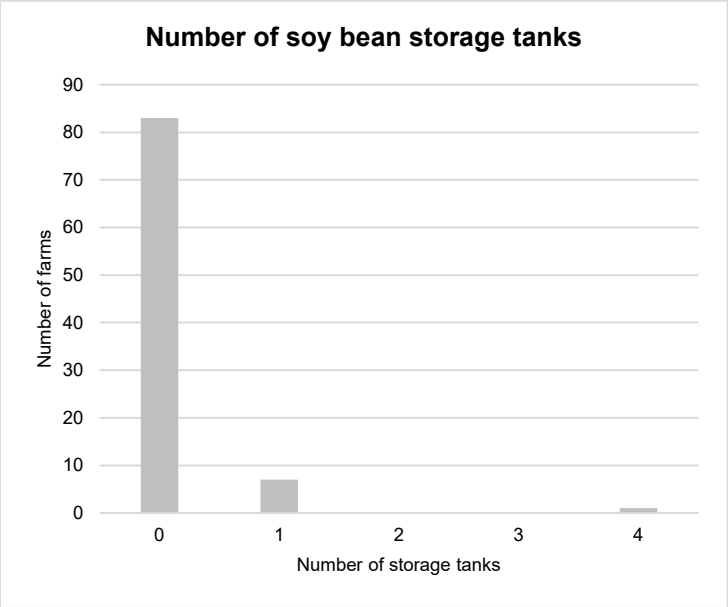
Answer Choices	Responses	
Average annual number of acres	100.00%	104
Estimated average total annual production (metric tonnes)	89.42%	93
Number of tanks (if applicable)	88.46%	92
Total storage capacity (metric tonnes)	88.46%	92
	Answered	**104**
	Skipped	**55**



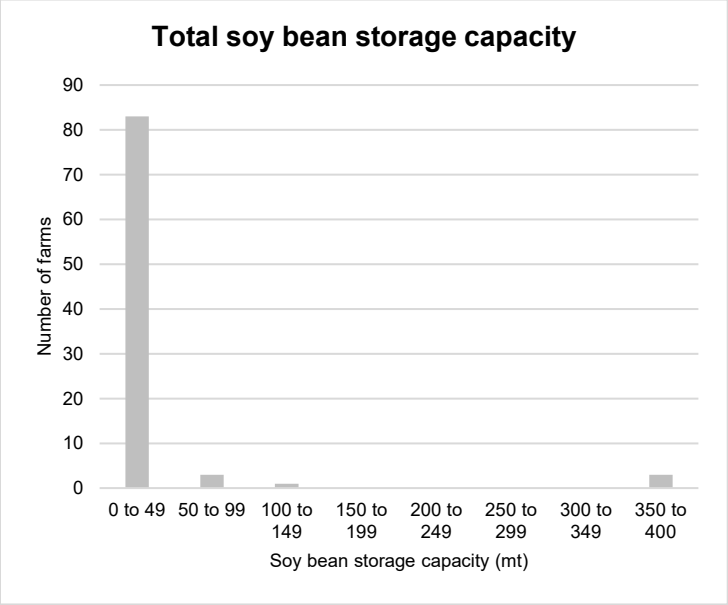
Acres used to grow soy beans	Number of Farms
0 to 99	97
100 to 199	2
200 to 299	2
300 to 399	1
400 to 499	0
500 to 599	0
600 to 699	0
700 to 799	1
Other responses: ▪ 40 Rotational (rental)	



Acres used to grow soy beans	Number of Farms
0 to 99	86
100 to 199	2
200 to 299	3
300 to 399	0
400 to 499	0
500 to 599	0
600 to 699	0
700 to 799	1
Other responses: ▪ ?	



Number of storage tanks	Number of farms
0	83
1	7
2	0
3	0
4	1
Other responses: ▪ ?	



Soy bean storage capacity (mt)	Number of Farms
0 to 49	83
50 to 99	3
100 to 149	1
150 to 199	0
200 to 249	0
250 to 299	0
300 to 349	0
350 to 400	3
Other responses: ▪ 180 Plus we sell some ▪ ?	

Questions 18
Do you grow another crop not listed above on your farm? If so, please specify and complete the following fields. Where not applicable, please insert "0".

Answer Choices	Responses	
Please specify crop...	100.00%	102
Average annual number of acres	95.10%	97
Estimated average total annual production (metric tonnes)	88.24%	90
Number of tanks (if applicable)	86.27%	88
Total storage capacity (metric tonnes)	88.24%	90
	Answered	**102**
	Skipped	**57**

Please specify crop	Average annual number of acres	Estimated average total annual production (mt)	Number of tanks (if applicable)
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
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0	0	0	0
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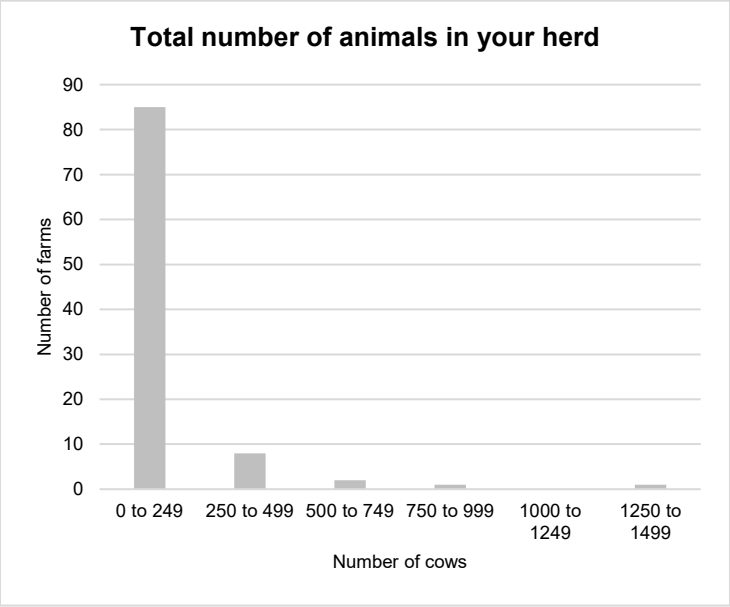
0	0	0	0
0			

0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
0	0	0	0
Alfalfa	90	0	0
Alfalfa	100	900	
Alfalfa forage	400	2400	0
Alfalfa grass	120	1000	0
Apples	20	220	
Carrots	50	1500	0
Cover crop	400	0	0
Cover Crops	600	0	0
Cranbie	80	64	0
Forage	1000	NA	0
Forage	100	340	0
Forage	300		
Forage	350	1500	0
Forage (triple-mix)	40 rotational (rental)	?	?
Forages	800	3100	0
Forages	670	0	0
Forages	600	0	0
grass	500	1700	0
Grass	200	2000	0
Grass	250	1000	
Grass	650	0	0
Grass	35	100	0
Grass	120	660	0
Grass	100		
Grass silage	700	0	0
Grass Silage	120	500	2 upright silos
Grass silage	400	2400 t	
Grass silage and hay	1000		
Grass/Alfalfa silage	200	500	0
Grass/Legume	160	600	0
Grass/Silage	400	1700	2
Grasses	180	1000	0
Grasses	250	0	0
Grassilage	450	8000 ton grassilage	0
Green Manure Plowdown	400	0	0
Greenhouse vegetables	4	750	na
Hay	700	0	0
Hay	200	200	0
Hay	230	2000	0
Hay	100	900	0
Hay	150	700 wet mt	0
Hay	325	1995	0
Hay	200	0	0
Hay	120	600 round bales	0
Hay	100		0
Hay	300	1500	0
Hay/Silage	120	800 bales/1200 lbs per bale	0

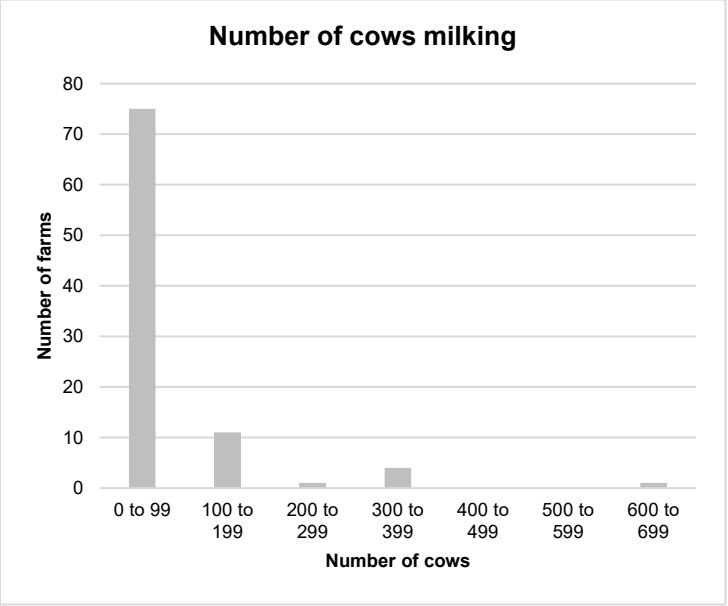
Hay and Silage	450	3000	0
Hay for silage	450	1500	0
Hay, silage	360		0
Hay/Silage	250	730	0
Hay/Silage	120	700 bales	0
Mixed silage	170	1400	0
Peas	150	185	1
Pumpkins/Sweet corn	12	0	0
Silage	60		
Silage hay	300		
Strawberries	6	15	0
Vegetables	180	2000	3
Winter Wheat/Barley	400 combined	800	6

Question 19
Do you have dairy cows on your farm? If yes, please complete the following fields.

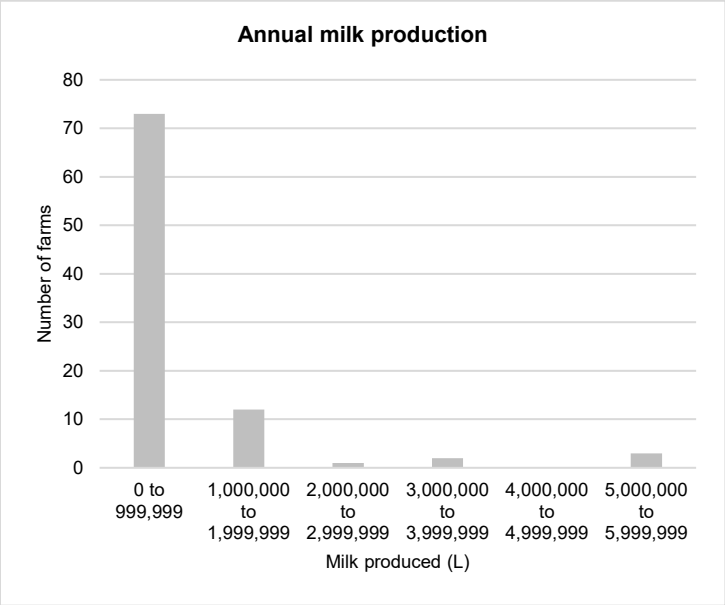
Answer Choices	Responses	
Total number of animals in your herd	100.00%	99
Number of cows milking	92.93%	92
Annual milk production (litres)	90.91%	90
	Answered	**99**
	Skipped	**60**



Number of Cows	Number of Farms
0 to 249	85
250 to 499	8
500 to 749	2
750 to 999	1
1000 to 1249	0
1250 to 1499	1
Other responses: ▪ 35-40	



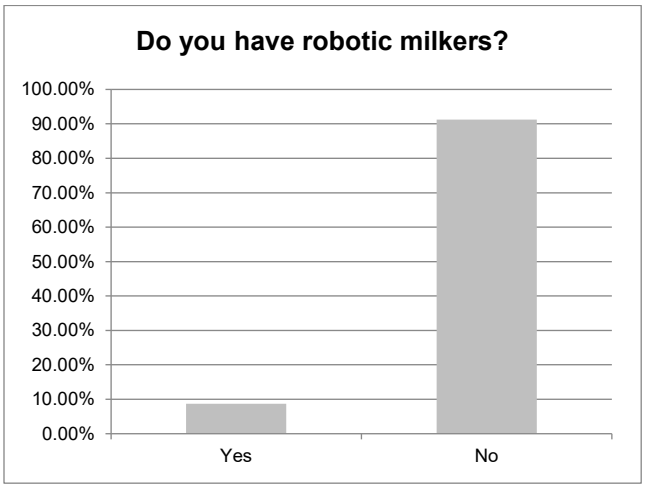
Number of cows	Number of Farms
0 to 99	75
100 to 199	11
200 to 299	1
300 to 399	4
400 to 499	0
500 to 599	0
600 to 699	1



Milk produced (L)	Number of Farms
0 to 999,999	73
1,000,000 to 1,999,999	12
2,000,000 to 2,999,999	1
3,000,000 to 3,999,999	2
4,000,000 to 4,999,999	0
5,000,000 to 5,999,999	3

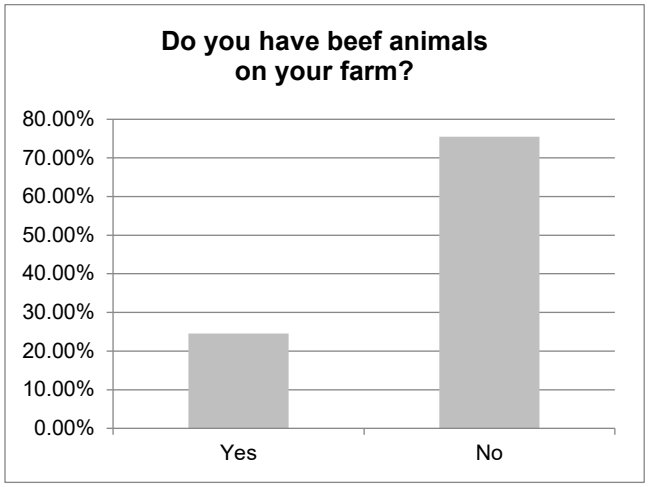
Question 20
Do you have robotic milkers?

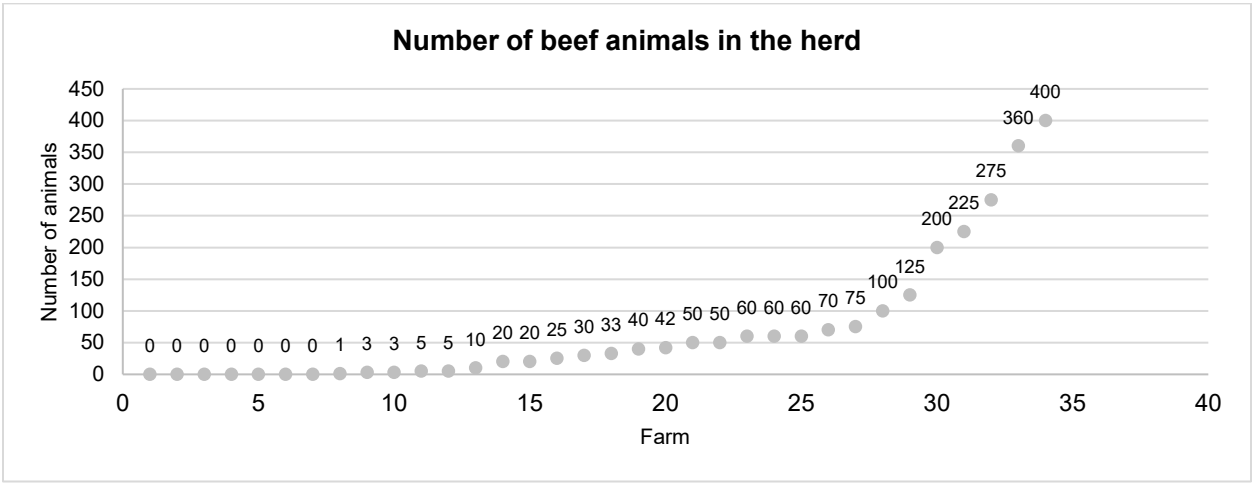
Answer Choices	Responses	
Yes	8.74%	9
No	91.26%	94
	Answered	**103**
	Skipped	**56**



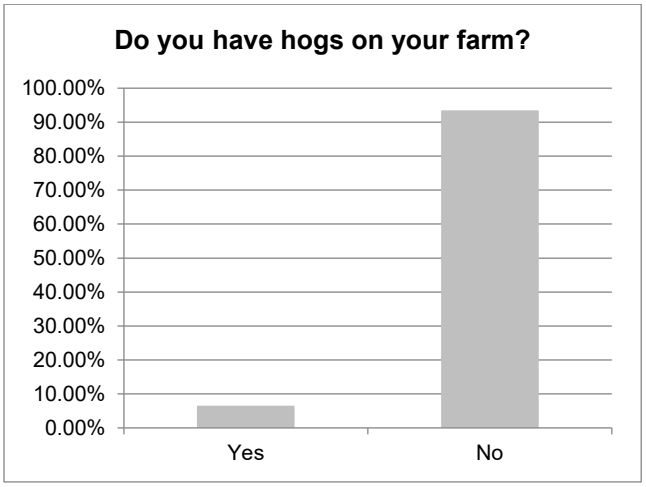
Question 21
Do you have beef animals on your farm?

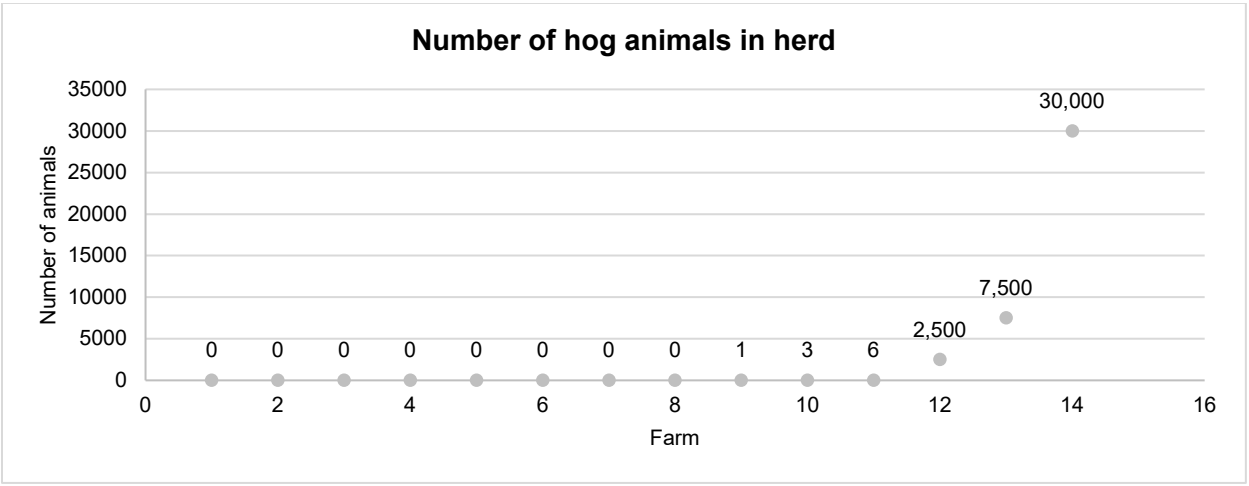
Answer Choices	Responses	
Yes	24.53%	26
No	75.47%	80
If yes, specify the number of beef animals in the herd.		34
	Answered	**106**
	Skipped	**53**





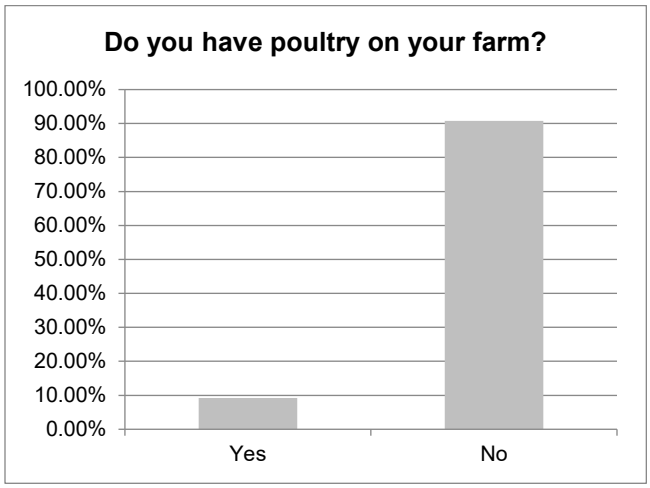
Question 22
Do you have hogs on your farm?





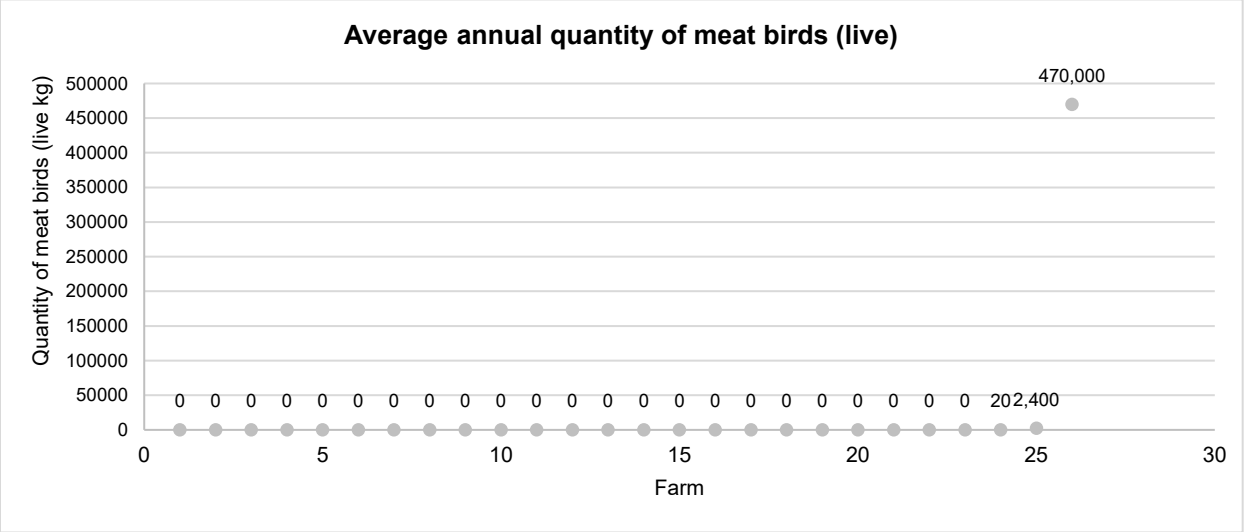
Question 23
Do you have poultry on your farm?

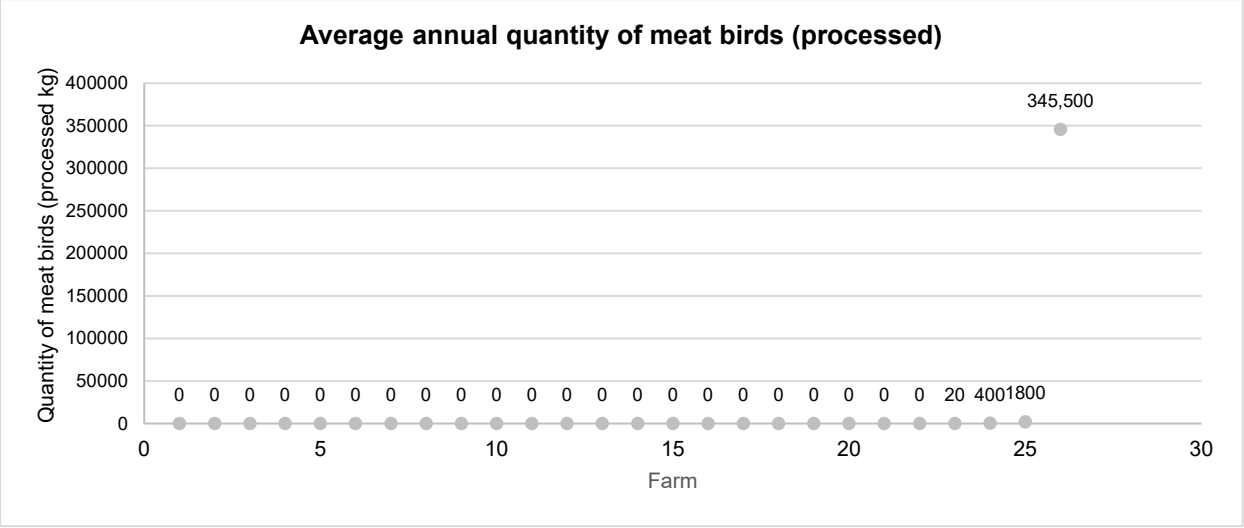
Answer Choices	Responses	
Yes	9.17%	10
No	90.83%	99
	Answered	109
	Skipped	50

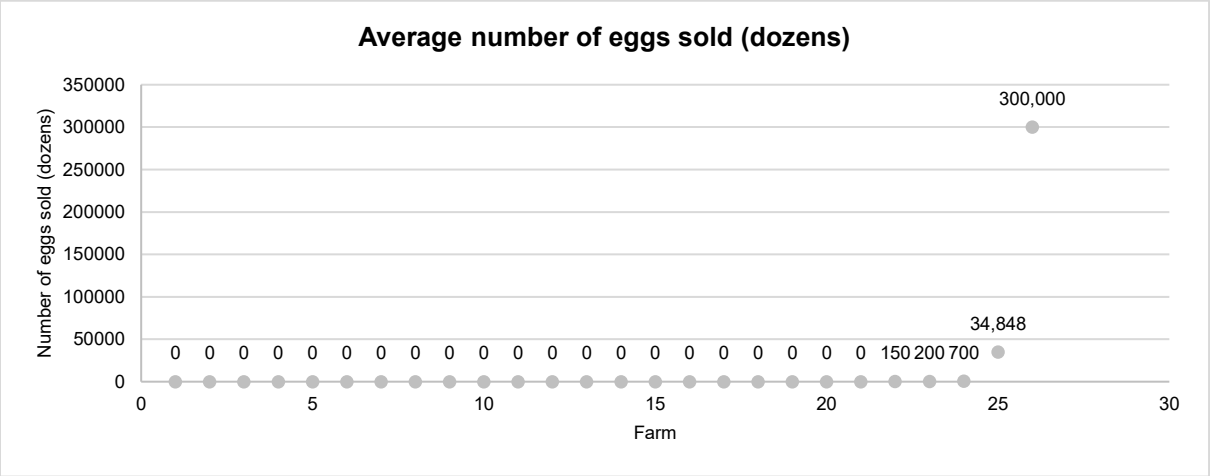


Question 24
If yes, please complete the following fields.

Answer Choices	Responses	
Number of birds	100.00%	32
Average annual quantity of meat birds (live kg)	81.25%	26
Average annual quantity of meat birds (processed kg)	81.25%	26
Average annual number of eggs sold (dozens)	81.25%	26
	Answered	**32**
	Skipped	**127**

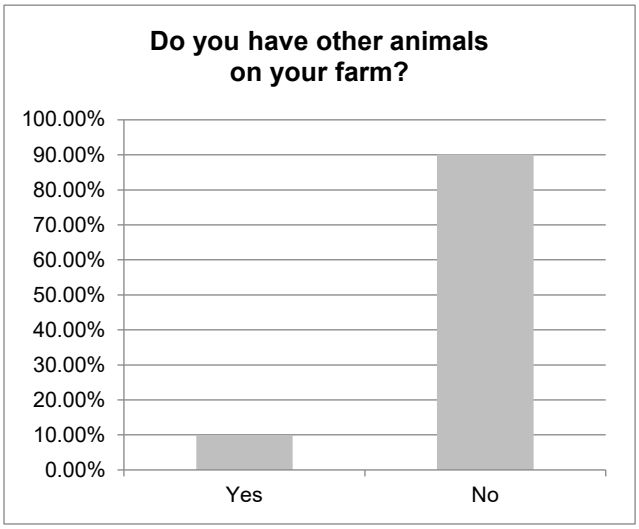





Average number of eggs sold (dozens)
Number of eggs sold (dozens)
350000
300000
250000
200000
150000
100000
50000
0
300,000
34,848
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 150 200 700
0
5
10
15
20
25
30
Farm

Question 25
Do you have other animals on your farm?

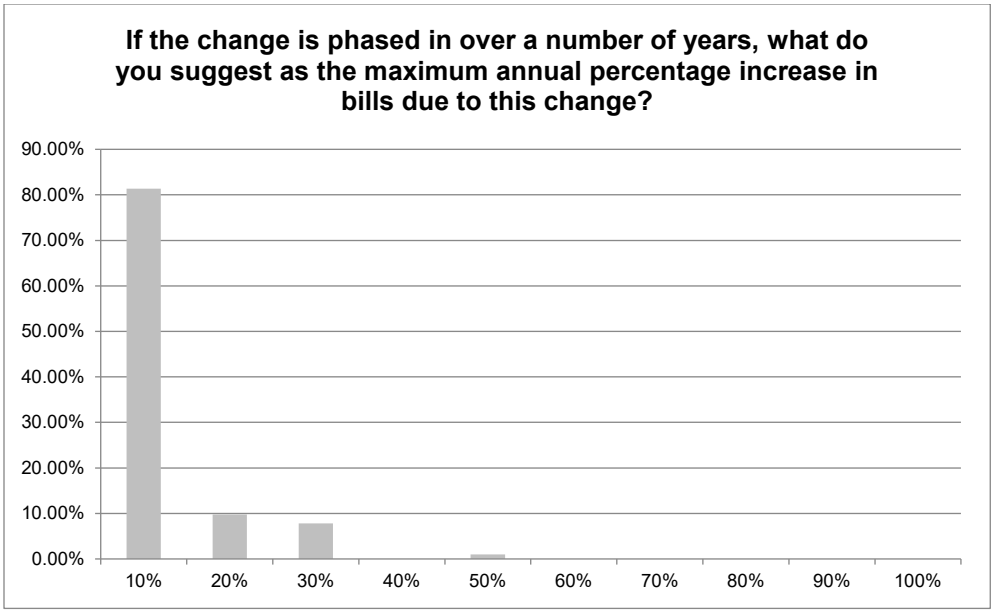
Answer Choices	Responses	
Yes	9.91%	11
No	90.09%	100
If yes, please specify		12
	Answered	**111**
	Skipped	**48**



If yes, please specify:
▪ Sheep
▪ Horses
▪ Sheep- 150 head
▪ Barn Cats and pigeons
▪ horses, goats, sheep, lama, donkey, mini pigs, rabbits
▪ Sheep
▪ 0
▪ 5 horses
▪ Dog
▪ 0
▪ 1 dog :-)
▪ Sheep and goats

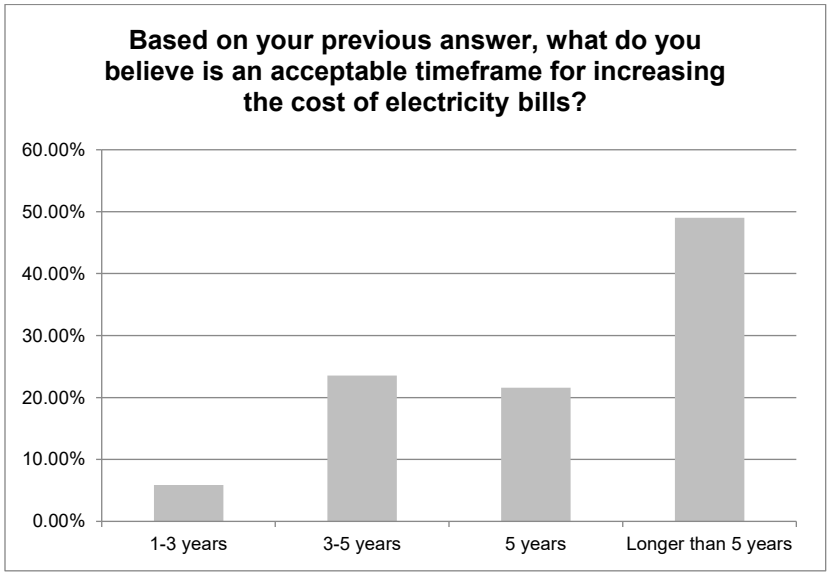
Question 26
For larger electricity users, the impact on your farm from the elimination of the second energy block in Maritime Electric's Residential Rate ranges based on electricity use (as you can see from the chart above). If the change is phased in over a number of years, what do you suggest as the maximum annual percentage increase in bills due to this change?

Answer Choices	Responses	
10%	81.37%	83
20%	9.80%	10
30%	7.84%	8
40%	0.00%	0
50%	0.98%	1
60%	0.00%	0
70%	0.00%	0
80%	0.00%	0
90%	0.00%	0
100%	0.00%	0
	Answered	**102**
	Skipped	**57**



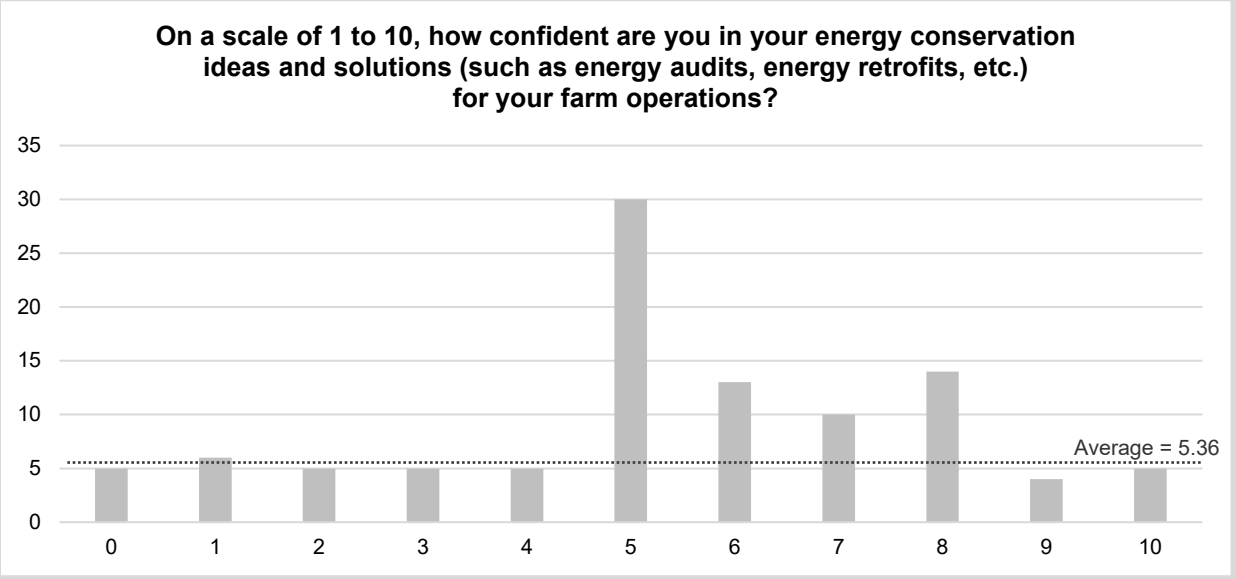
Question 27
Based on your previous answer, what do you believe is an acceptable timeframe for increasing the cost of electricity bills?

Answer Choices	Responses	
1-3 years	5.88%	6
3-5 years	23.53%	24
5 years	21.57%	22
Longer than 5 years	49.02%	50
	Answered	**102**
	Skipped	**57**



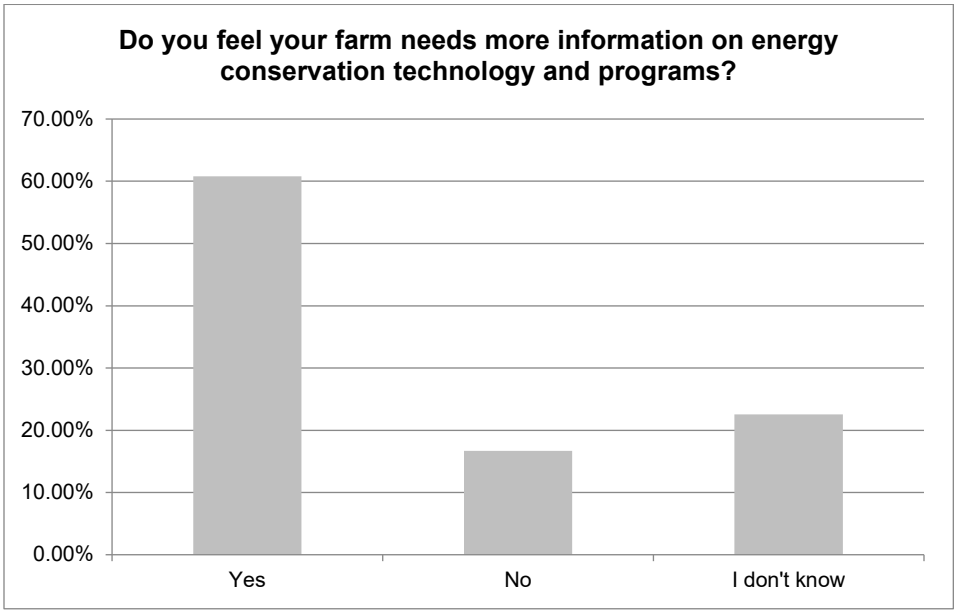
Question 28
On a scale of 1 to 10, how confident are you in your energy conservation ideas and solutions (such as energy audits, energy retrofits, etc.) for your farm operations?

Answer Choices	Average number	Total number	Responses	
(no label)	5.362745098	547	100.00%	102
			Answered	**102**
			Skipped	**57**



Question 29
Do you feel your farm needs more information on energy conservation technology and programs?

Answer Choices	Responses	
Yes	60.78%	62
No	16.67%	17
I don't know	22.55%	23
	Answered	**102**
	Skipped	**57**



Question 30 – Please provide further comments on energy conservation at your farm.

Answered	32
Skipped	127

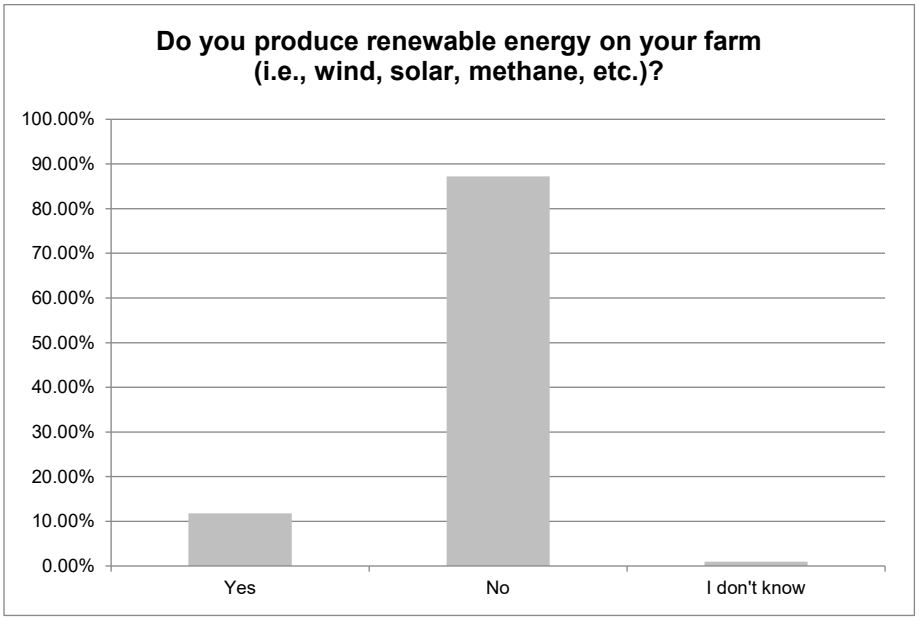
- We installed LED lights in our dairy barn this year.
- I believe we do a good job conserving energy on our farm. Our cows are on pasture in the summer months. This means that there are no fans running in the barn or lights on. In the winter months all lights are on a timer so they are not on when not needed. I' am unware of anywhere else we can conserve energy on our farm.
- Variable speed fans have saved me a lot over the years compared to the old rates.
- Our freezers are the main thing we need to get a handle on.
- Lighting variable speed motors gravity flow water systems waste water reclamation.
- Until we can access 3 phase power it's going to be impossible to decrease our energy needs.
- I'm currently in the planning process to install solar panels on my farm to help offset my residential and farm electricity costs and carbon footprint.
- A small sheep farm trying to conserve on all issues. Produce from rental farm land may not be of use to you.
- We have spent many years implementing energy conservation efforts on our farm, including LED lighting, biomass boiler for heating, energy star motors and appliances.
- No energy knowingly wasted on this farm.
- We have switched 90% of our lighting to LED type.
- Would be very beneficial to switch to 3 phase power if it was available.
- Most of the farmers I have known over the years, avoid waste whenever possible.
- Share information particular to our/each industry how much energy i would save by installing a particular retrofit etc. and share how much energy is being used by other farms producing the same products so we can compare per unit.
- If cost increases we will switch to fossil fuels.
- Always welcome ways to be more sustainable. We have invested in a wind-turbine that was not successful. Limit on net-metering limited to products available to use as ROI was not attainable.
- My farm uses a lot of power and machines are getting bigger. It is very difficult for me to buy much more energy efficient equipment without 3 phase. As it is i have added several 3phase motors but need to add an inverter to every one which is expensive.

- Need to be educated on energy solutions.
- I would be happy to participate in energy conservation solutions.
- We are looking into solar power right now.
- Three phase power is needed.
- Handout subsidy for more green energy.
- Power is too costly now. Rather 0% rate increase.
- Limited opportunities presently, but would assess any new programs based on merit.
- We have Led lights and have as much energy conservation equipment as possible.
- Need FREE access to 3 phase power everywhere.
- We have a plate cooler and a free heater in our dairy most of our fans and pumps are variable speed we have a fresh box/air exchange in our refrigerated warehouse so we are already conserving energy.
- Much larger grants available for solar power. Other provinces have programs that cover 50-80% of the cost to go solar. I would do it if the government pitched in more than 5-10% total cost. That's why nobody is solar in PEI. Terrible program.
- We utilize frequency drives on most of our potato warehouse ventilation fans and irrigation pump for energy savings. Almost all lights on the farm are LED. We have 1 solar installation which produces a small fraction of our overall needs.

  Our limitations to more energy efficiency include, 3 phase power line is 1.5 kms away, some of our potato ventilation systems are of old design and cannot utilize frequency drives and we rely on refrigeration for storing half of our potato production into the summer months. The high capacity well moritorium forces us to use a holding pond for our water supply which requires much more electricity than a high capacity well would to operate our irrigation system. The solar energy installation does not yield what was projected, causing a low Return on Investment. This holds us back from expanding our solar system.
- Reasonably priced access to 3 phase power would be considerable help to our energy conservation goals.
- LED lighting and precooling milk with well water, then recycling that water. Variable speed cooling fans for cattle
- If the energy payment plan was to change I would like to see some alternative on farm energy subsides come into place to help mitigate the cost of power and help the environment

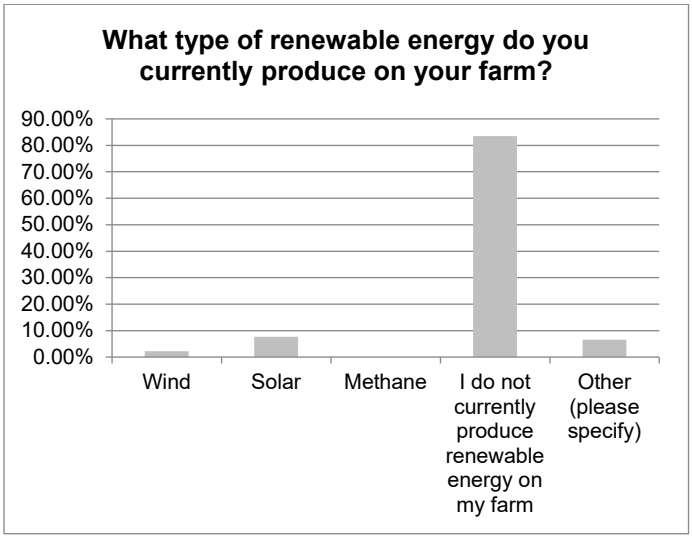
Question 31
Do you produce renewable energy on your farm (i.e. wind, solar, methane, etc.)?

Answer Choices	Responses	
Yes	11.76%	12
No	87.25%	89
I don't know	0.98%	1
	Answered	**102**
	Skipped	**57**



Question 32
What type of renewable energy do you currently produce on your farm?

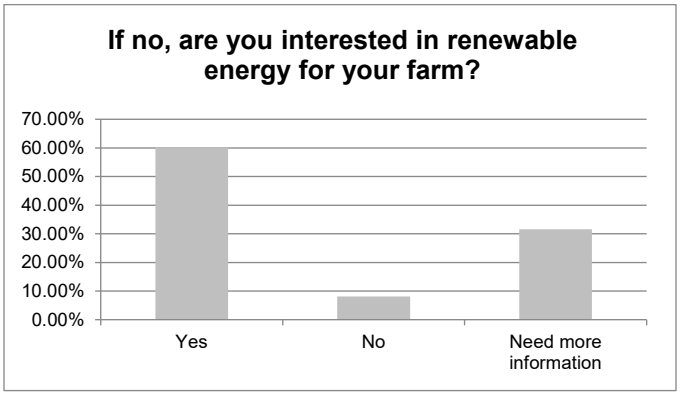
Answer Choices	Responses	
Wind	2.20%	2
Solar	7.69%	7
Methane	0.00%	0
I do not currently produce renewable energy on my farm	83.52%	76
Other (please specify)	6.59%	6
	Answered	**91**
	Skipped	**68**



Other (please specify)
▪ wood
▪ failed wind turbine
▪ water circulation system
▪ biomass
▪ Not working
▪ We lost 40,000$ to BerMac Wind Controls over their wind energy turbine

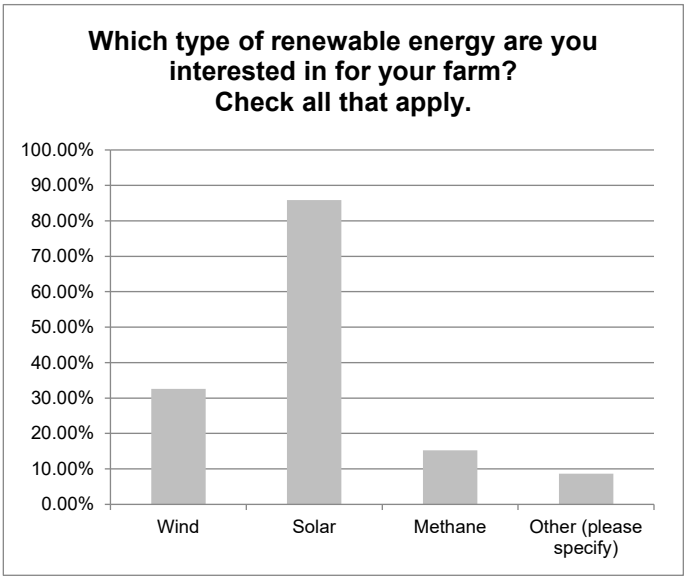
Question 33
If no, are you interested in renewable energy for your farm?

Answer Choices	Responses	
Yes	60.20%	59
No	8.16%	8
Need more information	31.63%	31
	Answered	**98**
	Skipped	**61**



Question 34
Which type of renewable energy are you interested in for your farm? Check all that apply.

Answer Choices	Responses	
Wind	32.61%	30
Solar	85.87%	79
Methane	15.22%	14
Other (please specify)	8.70%	8
	Answered	**92**
	Skipped	**67**



Other (please specify)
▪ We would love to put solar panels on the roof of our barn but I don't feel we can afford it.
▪ Unsure
▪ Hydro
▪ Water turbine generated (constant power solutions)
▪ Biodigester
▪ Geothermal
▪ Anaerobic digester
▪ Cheapest option

Question 35
Please provide any further comments you have.

Answered	23
Skipped	136

- We had a windmill on our farm but it never worked properly and eventually the blades flew off. It was here when we purchased the farm but the company that built it stopped operating and it was impossible to get parts to fix it.

  The main consumption of hydro on our farm, I feel, would be the cooling system for the bulk tank. I 'am unaware of a more efficient system for preserving milk. Until such a time as we are able to develop genetics in the cows to produce milk that doesn't spoil we will need to cool it!

- 30% is way too much for a 1 time jump in rates. Mine came to 27 in chart.

- We would rather pay less than more.

- A few years ago when they created HST the Gov included electricity when it was not applied to oil. The feedback from gov at the time was because of the electricity rate reduction agreement (which was only for 5 years and due to expire in a year). It could help bridge the gap of extra costs of electricity if the government removed it from HST.

- The parallel to be drawn between energy conservation and profitability of enterprises needs to focus on less capital intensive solutions unless in partnership with electrical service provider of PEI or island owned cooperatives of scale producing constant power solutions. Gov is wasting valuable resources by not collectively pooling resources for continuous power generation allowing utilities to plan for demand and reducing or stabilizing energy cost. Energy efficiency = profitability 2nd tier elimination on the grounds that it doesn't promote energy efficiency is a load of crap, farmers operate on margins that demand frugal attention to gains or efficiencies that contribute to their bottom line. Just one farmers thoughts.

- Allow net metering for 1 project to net meter back to more than 1 meter and pay a decent price for over production.

- We can’t afford any rate increases at all.

- Glad to participate, however, information may not be of much use to you...any extra costs to our small operation make it more difficult.

- Elimination of 2nd block just one more example of downloading residential costs onto primary producers without any option for price increases for primary production products.

- A balanced approach would be appreciated in any increases of rates or changes to 2nd block. This is a partnership between Maritime Electric as the provider and it's customers’ that has to be beneficial for all parties involved. There are many opportunities for Farm and Maritime Electric to work together.

- Always considered second block as the offset for no access to 3 phase. Extremely bad timing when the province encourages electric and farms are forced back to oil for things like hot water or feeding.

- Net-metering needs to be reevaluated.

- Dairy farms use a lot of energy, but they also contribute a great deal to the economy on PEI. I think that eliminating the second block is very unfair to the dairy farmers and farmers in general.

- There needs to be incentives or low interest loans created for a switch over.

- Removing the second block is not a fair way of balancing the R/C factor in the Rural Residential rate structure. Most supplies that farms purchase are priced on the volume of purchase. I cannot see where electricity should be any different.

- If we move to green energy, we are really interested in putting in a digester.

- I have a 50 KW wind turbine on the farm. It is not working at the present time, major issues have been due to have to convert back to single phase, cost prohibitive to put in three phase.

- Like to assess small commercial rate classification for our farm.

- 3 phase power available the same as fish plants would be a big help.

- If the government paid 50-80% of TOTAL COST of going solar is be interested.

- Should be more farm assisted programs for solar panel usage. Not just for Non-profit organizations.

- My use is more than 2x of your largest study participant and I think I have a net savings but am interested in better learning how the calculation is made.

- Our electricity bill is already extreme high.

- We are much higher than most other provinces.

  It is not fair and ridiculous to increase the price.

All our energy.
All the time.

MARITIME ELECTRIC
A FORTIS COMPANY

PRELIMINARY RESIDENTIAL CLASS LOAD STUDY RESULTS

TABLE OF CONTENTS

1.0 Introduction

In 2018, Maritime Electric began planning for a Load Study in order to obtain a better understanding of electricity usage by the Residential and General Service rate classes. The objective is to use hourly load data collected at a random sample of customers from each of the Residential and General Service classes to estimate the corresponding total hourly load for each of those classes.

The last time the Company undertook a study of this nature for the Residential and General Service classes was during 1992 to 1994. In recent years there has been a significant increase in the use of electricity for space heating and cooling on Prince Edward Island ("PEI"). The installation of heat pumps contributed to this increase in electricity usage, which can also be used for cooling in the summer. The current Load Study is intended to provide an updated understanding of usage patterns.

One application of these results will be to improve on the estimates of Coincident Peak ("CP") and Non-Coincident Peak ("NCP") loads for Residential and General Service used in cost allocation studies. The CP load is the load for the rate class as a whole at the time of the annual system peak load. Maritime Electric's investment in generation, transmission and substations, and their associated fixed costs, are a function of system peak loads. Thus, the CP load for a given rate class can serve as a measure for how much of these fixed costs should be allocated to that rate class.

The NCP load is the highest load for the rate class as a whole at any time during the year. Maritime Electric's investment in distribution lines and distribution transformers, and their associated fixed costs, are partly a function of NCP loads. Thus, the NCP load for a given rate class can serve as a measure for how much of these fixed costs should be allocated to that rate class.

2.0 Sample Selection

The Load Study involved the installation of meters capable of recording hourly load data at a randomly selected sample of customers. Stratified random sampling was used to minimize the size of the sample group needed to achieve a desired level of accuracy for

the study results. In this case, the desired level of accuracy for the class estimated loads was within +/- 10 per cent with 90 per cent confidence.

In stratified random sampling, the population is divided into several subpopulations. A random sample is selected from each subpopulation and used to estimate the load for that subpopulation. The estimated subpopulation loads are then combined to provide an estimated load for the total population. The overall sample size needed to obtain a given level of accuracy with a stratified population can be significantly less than if a simple random sample was taken from the total population.

The January 2017 monthly billed kilowatt hour ("kWh") values were used for determining the strata boundaries and sample sizes, while the January 2018 monthly billed kWh values were used for the random sample selection. The strata boundaries and sample sizes for Residential and General Service classes are shown in Table 1 and Table 2, respectively.

Table 1
Residential Strata (Rate Code 110 and 130) for 0 – 5,000 kWh

Strata	Strata Boundaries	Sample Size
Stratum 1	0 – 575 kWh	43
Stratum 2	576 – 1,200 kWh	43
Stratum 3	1,201 – 2,300 kWh	42
Stratum 4	2,301 – 5,000 kWh	43
Total		**171**

Table 2 General Service Strata (Rate Code 232)		
Strata	**Strata Boundaries**	**Sample Size**
Group 1		
Stratum 1	0 – 350 kWh	42
Stratum 2	351 – 825 kWh	35
Stratum 3	826 – 1,475 kWh	38
Stratum 4	1,476 – 2,350 kWh	38
Stratum 5	2,351 – 3,475 kWh	39
Stratum 6	3,476 0 5,000 kWh	38
Group 2		
Stratum 1	5,001 – 9,600 kWh	36
Stratum 2	9,601 – 17,400 kWh	36
Stratum 3	17,401 – 35,200 kWh	36
Stratum 4	35,201 – 100,000 kWh	36
Group 3		
Stratum 1	Greater than 100,000 kWh	8 existing ION meters

3.0 Implementation and Analysis

The timeline for implementation of the study was as follows:

- 2018 – approval obtained and meters ordered;
- 2019 – delays in delivery of meters slowed implementation;
- early November 2019 – last of the Residential meters were installed; and
- early March 2020 – last of the General Service meters were installed.

Beginning in the middle of 2020, there were problems with the meter vendor's software for the Load Study sample meters that made it difficult to access the hourly load data[1]. Retrieval of the data has since been successful, but due to the delay in data availability, the analysis of Residential loads used in developing this Rate Plan is based on only the 12 month period March 2019 to February 2020.

[1] Due to the relatively small number of meters in use by Maritime Electric for load study purposes, it was difficult for the Company to escalate data issues with the vendor ahead of other customers with significantly larger deployments.

On PEI, the annual system peak use of electricity occurs in winter. Historically, the peak occurred for the hour ending 18:00 (i.e., 6:00 p.m.) in December, driven mainly by lighting. Recently the winter peak has occurred in January in some years. This shift is attributed to an increase in electric space heating load, which is temperature driven, and thus higher in January and February because on average these are colder months than December.

Since much of Maritime Electric's fixed costs are a function of system peak loads, from a cost allocation study perspective, the most important Load Study results are for the months of December, January and February. For the Residential class, December 2019 is the first full month of data from the Load Study, and thus this Residential 2019/2020 winter peak has been used to inform this Rate Plan.

The strata shown in Table 2 for the General Service class include all year round General Service customers.

The strata shown in Table 1 for the Residential class include all year round customers with January 2018 usage of 5,000 kWh or less. Since little electricity usage in excess of 5,000 kWh per month is for domestic (i.e., household) loads, the sample selection for the Residential class was limited to customers with monthly usage of 5,000 kWh or less so as to focus on domestic usage.

However, to provide an estimate of hourly loads for the total Residential class, customers with monthly usage greater than 5,000 kWh also need to be analyzed. This was done by analyzing residential customers that used more than 5,000 kWh for January 2020 that were not already included in the January 2018 strata. There were 756 of these customers and they were separated into three cohorts as follows:

- 293 Domestic usage, with > 5,000 kWh billed for January 2020;
- 418 Farms, with > 5,000 kWh billed for January 2020; and
- 45 Other than Domestic usage or Farms, with > 5,000 kWh billed for January 2020.

Thus, for Load Study analysis purposes, the Residential year-round customers (Rate codes 110 and 130) were separated into seven cohorts, as follows:

Cohort 1 – consumption from 0 to 575 kWh for January 2018;
Cohort 2 – consumption from 576 to 1,200 kWh for January 2018;
Cohort 3 – consumption from 1,201 to 2,300 kWh for January 2018;
Cohort 4 – consumption from 2,301 to 5,000 kWh for January 2018;
Cohort 5 – Domestic (i.e. household) consumption > 5,000 kWh for January 2020;
Cohort 6 – Farm consumption > 5,000 kWh for January 2020; and
Cohort 7 – Other consumption > 5,000 kWh for January 2020.

Cohorts 1 through 4 correspond to the four strata for the 171 Residential sample meters, as shown in Table 1. Hourly loads[2] for these four cohorts were estimated based on interval data from the sample meters.

The hourly loads[2] for Cohort 5 were estimated by using the corresponding cohort 4 loads for January 2020, multiplied by the ratio of the cohort 5 kWh sales for that month to the cohort 4 kWh sales for that month.

Cohort 6 consists of larger farms served under the Residential class. However, farms that used 5,000 kWh or less for the January 2018 billing are included in cohorts 1 through 4 without being distinguished as farms. Estimates of hourly loads[2] for cohort 6 were derived from interval data from the sample of 87 farms in the Farms Study, a concurrent survey of electricity usage by the larger farms on PEI.

Cohort 7 consists of 45 accounts that are not farms or household uses of electricity. Three quarters of the usage is accounted for by the six largest loads, which are two cannabis grow-ops, three fish farms and one greenhouse operation. Cohort 7 hourly loads[2] during January 2020 were estimated by scaling up the corresponding metered loads for the largest customer by the ratio of the cohort 7 sales for that month to the sales for the largest customer for that month.

[2] CP and NCP values are referred to as hourly loads for ease of understanding.

As part of assessing the impact of this Rate Plan on customers across the Residential Class, a revenue-to-cost ("RTC") ratio was estimated for each of the seven cohorts. To estimate a RTC ratio for a cohort, the following load data for the cohort is needed:

- number of customers (i.e., accounts);
- CP demand;
- NCP demand; and
- kWh energy sales (consumption).

The number of customers and kWh sales are available from the Maritime Electric billing system. The CP and NCP demands (or hourly loads) were estimated as described above.

The 2017 Cost Allocation Study, the most recent study done for Maritime Electric, was used to estimate revenues and costs. Using the 2017 unit cost factors for 2017 from this Preliminary Load Study, estimates were developed for the 2017 costs that would have been allocated to the March 2019 to February 2020 loads for each of the seven cohorts had those loads been served by Maritime Electric in 2017. Similarly, estimates of the revenue were developed for each of the cohorts had they been served by Maritime Electric in 2017. For each cohort, the 2017 revenue was then divided by the 2017 allocated cost to get the RTC ratio that the 2017 Cost Allocation Study would have estimated for each cohort.

The results of this analysis are shown in Table 3 below, which is summarized as Table 3 in Section 8.3 of the Rate Plan Application.

Table 3 Analysis of Residential Year Round Cohorts (For 12 month period March 2019 to February 2020) Residential Rear Round Classes (Rate Codes 110 and 130)							
January billing cohorts:	**# Customers**	**CP (MW)**	**NCP (MW)**	**Energy (GWh)**	**2017 Allocated Costs ($000s)**	**2017 Base Revenue ($000s)**	**RTC Ratio (%)**
Usage 0 to 575 kWh	22,807	17.0	27.0	93.9	19,113	19,501	102.0
Usage 576 to 1,200 kWh	18,980	40.8	42.3	163.3	28,963	27,568	95.2
Usage 1,201 to 2,300 kWh	11,687	37.1	38.5	152.9	25,060	23,833	95.1
Usage 2,301 to 5,000 kWh	7,017	48.4	48.4	150.6	26,102	21,367	81.9
Domestic > 5,000 kWh	293	4.3	4.3	11.6	2,070	1,462	70.7
Farms > 5,000 kWh	418	7.8	10.7	42.5	5,663	4,816	85.0
Other > 5,000 kWh	45	3.3	4.7	10.5	1,752	1,140	65.1
Combined	**61,247**			**625.3**	**108,722**	**99,688**	**91.7**

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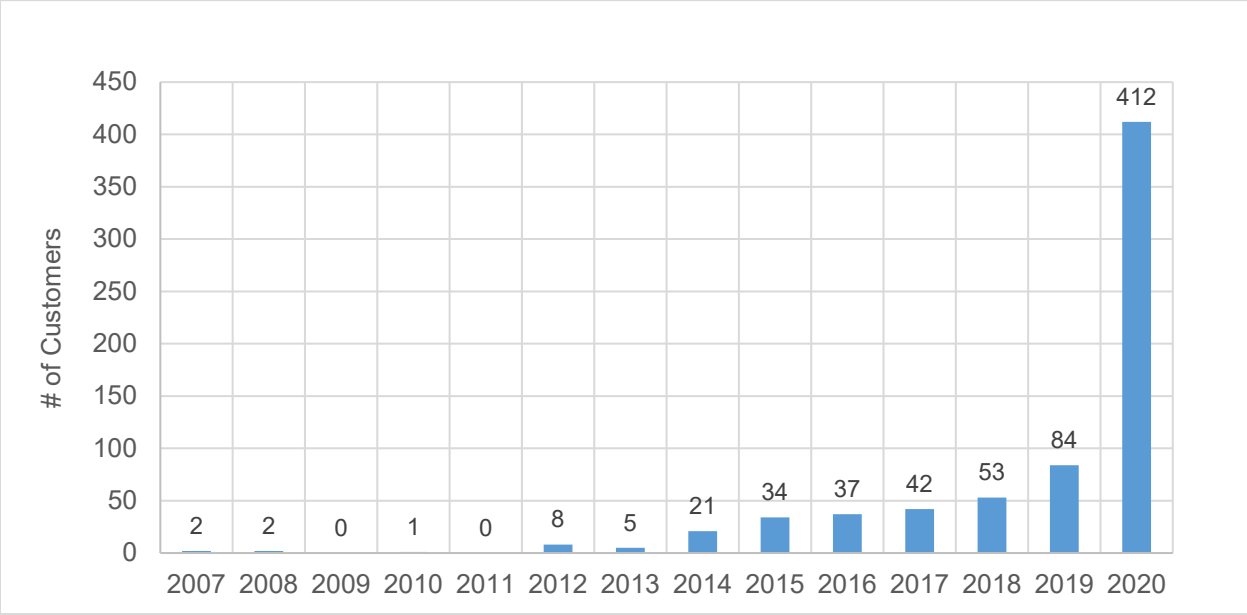
MARITIME ELECTRIC
A FORTIS COMPANY

RESIDENTIAL NET METERING IMPACT ON RATES

The Provincial Government's rooftop solar incentive has been popular with Maritime Electric customers. Announced in August 2019, rebates of up to $10,000 are available to customers to install solar panels. This spurred a pronounced increase in net metering applications submitted to the Company, as illustrated in Chart 1.

Chart 1. New Solar Net Metering Customers by Year



The average size of a solar net metering installation on Maritime Electric's system in 2020 was 9.2 kilowatts ("kW"). The size may increase depending on future legislative changes that allow larger installations by farms and municipalities.

Solar generation on Prince Edward Island ("PEI") is considered an energy source and cannot be considered a source of capacity. This means that solar generation cannot help reduce the system's infrastructure needs as it cannot aid in reducing system peak loading[1]. From a system perspective, its presence and output only means that less energy has to be purchased from the mainland when the sun is shining.

[1] PEI's system peak occurs during winter months after sundown.

Table 1 is an example of the extent to which a customer's bill can be reduced as a result of net metering.

Table 1 **Net Metering Comparison – Residential Urban Customer**			
		Without Solar	**With Solar – Net Metering**
Customer Energy Charge[2] ($/kWh)	A	0.1437[3]	-
Monthly Service Charge ($/month)	B	24.57	24.57
Average Annual Usage (kWh)	C	10,120	10,120
Solar Installed (kW)		-	9.2
Calculation of Annual Charges:			
Energy Charge ($)	D = A x C	1,454	1,454
Service Charge ($)	E = B x 12	295	295
Annual Energy Charge Offset[4] ($)	F = D	-	(1,454)
Total Annual Charges ($)	G = D + E + F	**1,749**	**295**

Table 1 demonstrates that a net metering customer can reduce their annual charges to just the monthly service charge.

The customer energy charge per kWh, of $0.1437, is designed to recover both energy (i.e., variable) and fixed costs. The current net metering pricing structure allows net metering customers to offset the entire energy charge by generating the energy they need from their solar installation. As such, net metering customers generally are not paying all of the fixed costs associated with the service they are receiving. On an annual basis, it is estimated that a net metering customer could avoid approximately $645 of fixed costs (10,120 kWh x $0.0637). These "avoided" costs are, therefore, being recovered from other customers (i.e., those customers without a solar installation).

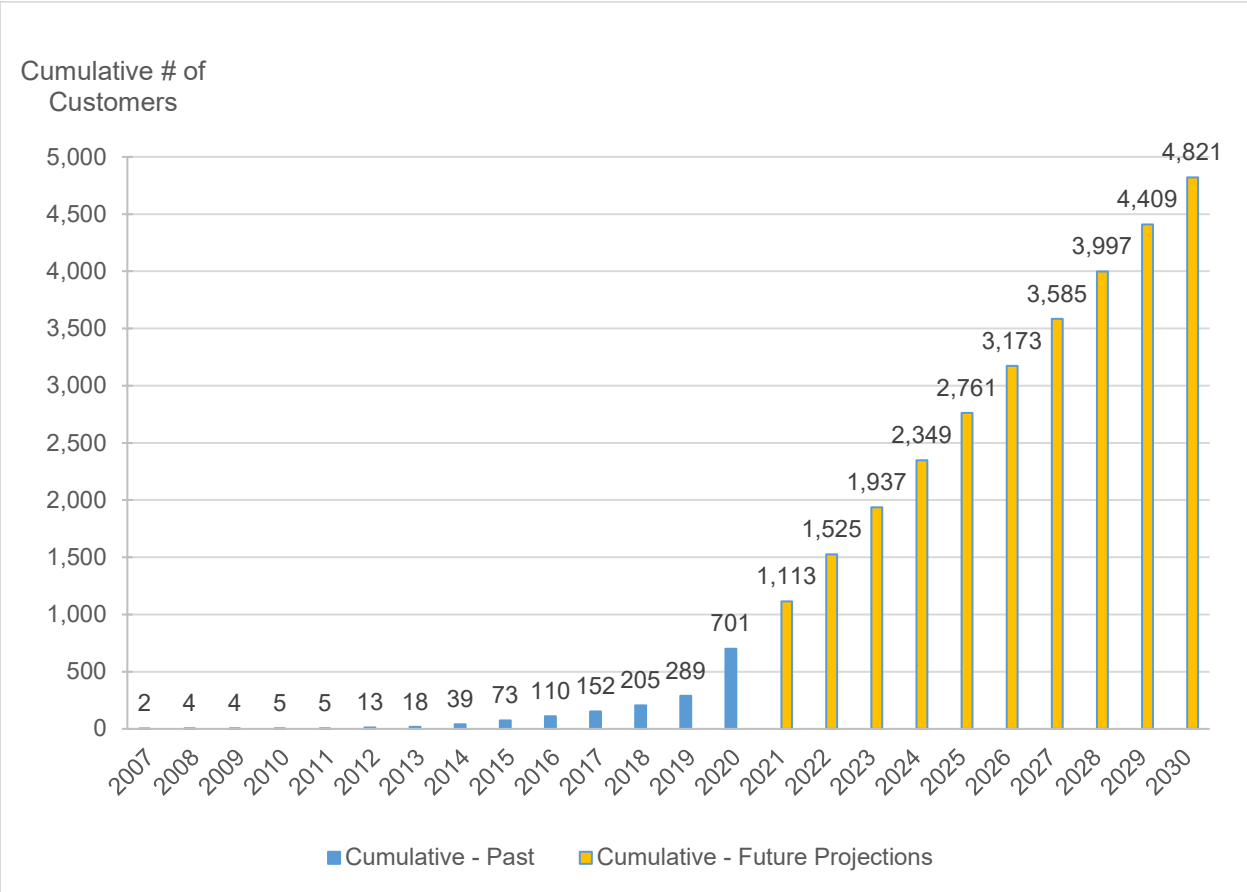
Continuing to use the example demonstrated in Table 1, the annual fixed costs of serving a residential customer is approximately $940 (annual service charges of $295 plus fixed costs

2 2020 Residential first block energy rate.
3 Comprised of approximately $0.08/kWh to recover cost of energy and approximately $0.0637/kWh to recover fixed costs.
4 A 9.2 kW solar installation is designed to be able to generate the amount of electricity that an "average" customer consumes. Therefore, in this example it is assumed that the solar installation generates 10,120 kWh per year.

collected in the kWh energy charge of $645). A net metering customer pays annual fixed costs of $295 resulting in a revenue-to-cost ratio of 31 per cent ($295/$940), which is well outside the 95 to 105 per cent target range.

At the end of 2020, Maritime Electric had only 701 net metering customers, which translates to approximately $452,145 of annual fixed costs[5] being incurred by net metering customers but recovered from other customers (i.e., cross-subsidization). Customer rates should be designed to minimize, rather than eliminate, cross-subsidization within or across customer classes. Therefore, this immaterial level of cross-subsidization does not need to be corrected immediately. However, if the 2020 rate of solar installation continues (i.e., 412 solar installations per year), it is estimated that there will be 4,821 net metering customers by 2030, as demonstrated Chart 2.

Chart 2. Actual and Projected Net Metering Customers



[5] 701 net metering customers x $645 avoided fixed costs.

Left unchecked, the current rate structure could result in a significant level of cross-subsidization. Therefore, the Company will continue to monitor the number of solar installations added to the system each year and will consider the resulting implications in future rate design applications.